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Comprehensive Report on the Preparation of Validated Strategies for Army Battalions

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Resourcing for training is based on the Battalion Level Training Model for a particular unit type. The BLTMs are event-based and describe the number of times particular training events must be completed each year to sustain readiness. The objective of this effort was to develop task-based Combined Arms Training Strategies to serve as the foundation for revised BLTMs. The first phase of the project was to develop the CATS for 11 different battalion/squadron types that accounted for 60% of the operating tempo. The second phase was to validate the CATS with 3 stakeholder groups: proponent schools, battalion commanders in test bed units, and battalion commanders in test bed units in Europe. The nature of this validation was to obtain concurrence that the CATS for each unit addressed the correct set of tasks, used an appropriate mix of field and TADSS events, accurately described the training audience and prerequisite gates, and described a training program that would sustain unit performance given current levels of turbulence.

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FINAL REPORT:

COMPREHENSIVE REPORT ON THE PREPARATION OF VALIDATED STRATEGIES FOR ARMY BATTALIONS

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Many people contributed to the accomplishment of this project. The overall concept originated in the Office of the Deputy Chief of Staff for Operations and Plans-Training (ODCSOPS-TR). Colonel Scott Marcy, then Deputy Director of Training in ODCSOPS, was the initial proponent in that office. Subsequently, Colonel Michael Deegan, Chief of the Training Operations Division in ODCSOPS became the proponent, and was followed in that role by Colonel James Gunlicks. ODCSOPS-TR requested that the Army Training Institute for the Behavioral and Social Sciences (ARI) perform the overall management and direction of the project. Dr. Robert Holz of ARI provided direct guidance to project staff and was a substantial technical resource. Mr. Michael McCluskey of ARI managed the programmatic aspects.

Three other project advisors are acknowledged for their support and substantive input: Dr. Jack Hiller, who was Director of Training Systems Research for ARI at the inception of the project, and now heads MANPRINT in the Office of the Deputy Chief of Staff for Personnel (ODCSPER); Dr. Lt. Gen. (Ret.) Frederic J. Brown; and Major General Stewart W. Wallace, Director of Training in ODCSOPS.

The commanding generals of the TRADOC proponent centers are acknowledged for their willingness to provide access to personnel and documents to be sure that the latest doctrinal information was included in the strategies. Some of the centers were substantially revising their doctrine, yet were able to provide the developers with considerable insight into the emerging doctrine and assist with multiple reviews of the prototype templates. The project point of contact at each center was:

Point of Contact	Proponent School
James D. Patton	U.S. Army Aviation Center
Rayburn W. Toy	U.S. Army Engineer Center
Michael O. Kelley	U.S. Army Armor Center
Michael Tryon	U.S. Army Infantry Center
CPT Mark Barkley	U.S. Army Field Artillery Center
J. Garcia	U.S. Army Air Defense Center
B. J. Gilmore	U.S. Army Combined Arms Support Command

The leaders of the units that served as test beds for the strategies are owed a special acknowledgement. In the midst of very demanding schedules, they were willing to make the additional effort to assist the developers of the strategies with the formulation of the initial prototypes, to discuss the validity of the evolving strategies, and to implement aspects of the

strategies. These personnel were told that their units and their own names would remain anonymous, consequently they are not named here.

The contractor team that developed the Combined Arms Training Strategies was spread from coast to coast. They made extensive use of electronic mail to exchange ideas and submit documents to the main project office in Monterey, California. The development team consisted of Michael Keenan, William Stramm, Robin Elder, Mike Mullen, Allen Whitley, William Parson, Martin Anderson, James Root and Sam Whitley, under the technical direction of Thomas Graney. Richard Gerding was the overall project manager for the development phase. After the project moved into the validation phase, Michael Keenan assumed the overall project management. Ward Keesling directed technical aspects of the validation effort. William J. Mullen III was the overall project director throughout the period of performance.

The validation phase involved data collection in the United States (CONUS) and in Germany. John Mulshine and Richard Munoz were the primary data collectors in the United States, and Peyton Randolph and Chuck Ridenour performed this role in Germany. Mike Mullen also served as data collector for his battalion type, and Marshall Clevenger assisted with the data collection from a CONUS unit that was not collocated with the rest. The data collectors were the constant eyes and ears of the project among the units that served as test beds for the strategies. They collected routine data, attended training briefings, kept track of changes to training calendars and scheduled the appointments for the developers to interview unit leaders about their use of the strategies.

The primary product of this project was the development and publication of the validated strategies for eleven different battalion types. Stan Hutton managed the flow of constant updates and revisions and produced the electronic and hard copies of the strategies. Several versions were produced in sequence for purposes of review with the proponent schools, units in the field, and ARI and ODCSOPS-TR personnel. The support staff for this effort consisted of Lisa Munoz, Rebecca Bania, Christine Kelso, and John Mulshine. Peter Bond provided editorial assistance to check consistency across the various templates.

This final report is about both the development and validation phases. Michael Keenan and Thomas Graney wrote the first chapter, about the development of the strategies. Ward Keesling and Patrick Ford wrote the second chapter, about the plan for the validation phase. Ward Keesling wrote the third chapter, reporting the findings, with technical input from William Stramm and Patrick Ford. The developers and data collectors made many astute observations that have been incorporated into these chapters. Appendix A was written by Thomas Graney, Ward Keesling and Peter Bond. Stan Hutton wrote Appendix B. William Stramm and Stan Hutton wrote Appendix C. Jack Briscoe, William Walsh and Ward Keesling wrote Appendix D. Peter Bond and William Mullen provided overall editorial and substantive review. Dr. Robert Holz of ARI also provided substantive and editorial review.

FINAL REPORT

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EXECUTIVE SUMMARY

BACKGROUND

The break up of the Soviet Union has radically changed the nature of the threats faced by the U.S. Army. As the Soviet threat has diminished, it has been replaced by the possibility of simultaneous involvement in mid- to high-intensity conflict in two separate regions. At the same time, requirements of the U.S. domestic economy have led to pressures to reduce the military budget. To maintain a combat ready force, tailored to the most likely threats, the Army must optimize its use of training resources.

Historically, realistic field training, which is expensive, has been critical to the readiness of combat units. In recent years, much effort has been devoted to developing virtual and constructive simulations and simulators that are capable of training many tasks in realistic environments, without incurring the high operating expenses associated with use of combat vehicles. Some of these are fully deployed, while others are still being deployed. A new simulator, the Close Combat Tactical Trainer (CCTT) is to be fielded in the near future, and the variants of this system for combat support units are to follow in due course.

Presently, resourcing for training is based upon the Battalion Level Training Model (BLTM) for a particular unit type. The BLTMs are event-based models: each BLTM describes the number of times particular training events (e.g., a Field Training Exercise, or FTX) must be conducted in the course of a year to sustain unit readiness. The BLTMs do not explicitly address combined arms training. They do not describe the tasks to be trained during the exercises; they do not suggest a sequence for the exercises; they do not describe how to use all of the training aids, devices, simulators and simulations (TADSS: e.g., JANUS, SIMNET) available to the units; they do not include platoon-level training; and they use the same exercises for every battalion type.

The Office of the Deputy Chief of Staff for Operations and Plans - Training (ODCSOPS-TR) is revising the BLTMs to make maximum use of the existing inventory of TADSS as well as future developments (e.g., CCTT). The foundation for the revised BLTMs will be new, task-based combined arms training strategies (CATS). Because they are task-based, rather than event-based, CATS provide more complete descriptions of training: identifying the tasks to be trained by each event at each echelon, the frequency with which the tasks must be trained to sustain high levels of readiness, and laying out a menu of events and media that may be used to train the tasks.

ODCSOPS-TR asked the Army Research Institute (ARI) to manage and provide technical oversight on this project which addressed the development and subsequent field validation of CATS. This work was carried out in two phases:

Phase 1. Develop the CATS for 11 different battalion/squadron types:

- Air Defense Artillery Battalion (Avenger)
- Air Defense Artillery Battalion (Heavy)
- Armor Battalion Task Force
- Assault Helicopter (UH-60) Battalion Task Force
- Attack Helicopter (AH-64) Battalion/Squadron Task Force
- Cavalry Squadron (Heavy Division)
- Engineer Battalion, Engineer Brigade (Heavy Division)
- Field Artillery Battalion (155mm Self-Propelled Howitzer)
- Field Artillery Battalion (Multiple Launch Rocket System)
- Forward Support Battalion (Heavy Division)
- Mechanized Infantry Battalion Task Force

These types of battalions collectively account for 60 percent of the operating tempo (OPTEMPO: the mileage or hours on the unit's base item of equipment required for one year of training) costs for the Army. When implemented, these task-based training strategies should improve training and provide a firm foundation for a large component of the Army's OPTEMPO projections.

Phase 2. Validate the CATS with three stakeholder groups: the Training and Doctrine Command (TRADOC) proponent schools, battalion commanders in test bed units in Forces Command (FORSCOM), and battalion commanders in test bed units in US Army Europe (USAREUR).

The nature of this validation was to obtain concurrence that the CATS for each unit addressed the correct set of tasks, used an appropriate mix of field and TADSS events, accurately described the training audience and prerequisite training (training 'gates') for each training event, and described a training program that would sustain unit performance given current levels of turnover and turbulence. Additional information was to be obtained by observing the test bed battalions' training practices after they had been exposed to CATS.

PHASE I -- ACTIVITIES AND RESULTS

Two steps were undertaken in Phase I. The first step was the development of a model that could guide the further development of the CATS for each type of battalion. The model was intended to be broadly applicable: It was to be used to develop prototype strategies for the unit types identified above, and it was to be useful to leaders and training managers of all types of units in fulfilling many of the planning and coordinating activities outlined in FM 25-100, Training the Force. A small group of former battalion and brigade commanders with extensive experience in Army training examined both the current training doctrine and the present training environment, and developed a model that incorporated the following factors:

- Missions/tasks. These are the bases for determining what needs to be trained.

- Frequency/interval. This establishes the number of times tasks must be retrained in order to sustain proficiency.
- Training means. This factor combines events (e.g., FTX) and media (e.g., CCTT). Each training means is further described by five additional factors:
  - Estimated duration. This characteristic of the training means is needed so that training calendars can reflect time requirements accurately.
  - Means quality. This aspect of the training means will assist the leader or training manager at any echelon to understand the realism of the exercise and the extent to which sound decisions about unit performance can be based on the exercise.
  - Training unit audience. Each means has a specified training audience.
  - Prerequisite training gates. These are the proficiencies that leaders and subordinate forces must have attained in order to take optimal advantage of the particular training means.
  - Comments. This aspect was added to facilitate communication among leaders and training managers at different echelons. It provides a mechanism for the leader or training manager to clarify the purpose and desired outcome of the event, and to make general remarks concerning the resourcing and conduct of the exercise.

To support the development of CATS, the factors in this model were arrayed as a template with eight columns. The purpose of this template was to reinforce the relationships among the various factors.

A further goal was imposed on the development process: The strategy for each battalion type was supposed to sustain readiness at the T-1 level, which was defined for this project to be "deployable within five days of notification." By Army doctrine, T-1 units have up to 14 days to deploy. The more stringent standard was imposed on CATS developers in order to be most sure that units implementing CATS would meet the 14-day standard.

To illustrate the development approach, a draft prototype strategy for the armor battalion task force was generated. A prototype training calendar based on this draft strategy was also developed as a check on its feasibility. This approach to CATS development was accepted by ODSCOPS-TR, TRADOC proponent schools, and commanders in FORSCOM and USAREUR.

In the second step of Phase I, for each of the 11 battalion types identified earlier, a former Army officer, qualified in his respective branch and with extensive experience with Army training, was selected to develop a prototype CATS.[1] These personnel were given thorough instruction in the use of the CATS template. They were instructed to review all of the current

[1] Originally, there were 10 battalion types scheduled for CATS development. The Air Defense Artillery Battalion (Avenger) was added later, and the developer for this unit began this work at a later time.

training doctrine, as well as the current tactical doctrine for their unit type. They were briefed on Army Training XXI, as reflected in Warfighter XXI and Warrior XXI; and they were briefed on anticipated developments in TADSS. Each used the CATS template to record the strategy he developed for his type battalion, and its subordinate echelons. For purposes of this project, a unit was considered to consist of six echelons: Battalions/squadrons (as an entity greater than the collection of their parts), staffs, companies/troops/batteries, platoons/sections, squads/crews, and individuals. The training activities of each echelon were further subdivided into one of three major functional categories in which the unit may be engaged: Fight, Deploy/Redeploy, and Sustain. For each battalion type a CATS prototype was completed for each combination of echelon, functional category and mission.

The thorough front-end analysis of each battlefield operating system (BOS) for each type unit made it obvious that the tasks necessary for staff proficiency were not well defined and that the inter-BOS and intra-BOS relationships were not well understood. Additionally, there is a weakness in the support provided to unit commanders in the area of battle staff training. This weakness is caused by the lack of training support packages (TSPs) and Mission Training Plans (MTPs) for the staff, and is exacerbated by the turnover of qualified trainers, i.e., XOs and S3s. These problems led to the development of a series of BOS-related tasks which are almost independent of battalion type and which represent functions performed in virtually every type of mission the unit conducts. This task list is included in each strategy as staff tasks.

Further, it was obvious that the staff is an organization every bit as complex as a company team to train. The echelons within the staff organization require individual and collective skill proficiency, and coordination between and among staff groups must also be trained. As a result, the strategies contain a paradigm for staff training that is unique in both training plan and detailed task analysis. This paradigm starts with training in individual and section functions, responsibilities, and tasks. It progresses to staff group training oriented to the interactions of the various staff sections. It culminates in a staff exercise (STAFFEX) which trains all aspects of staff functioning simultaneously.

Phase I resulted in the development of prototype CATS for the 11 different battalion types. These were briefed to ODCSOPS-TR, the TRADOC proponent schools, and commanders in FORSCOM and USAREUR, who accepted them as the basis for further development and validation.

PHASE II -- ACTIVITIES AND RESULTS

Two activities occurred concurrently in Phase II:

- The prototype templates were reviewed in detail by personnel at the TRADOC proponent schools, and by commanders and training managers within test bed units in FORSCOM and USAREUR.

- Within the limitations of their resources and the guidance they received from higher echelons, the test bed units attempted to implement the prototype CATS.

The reviews provided by the test bed units and by the proponent school personnel led to revisions in the CATS to account for changing doctrine and actual training environments. These reviews were particularly helpful in identifying training sequences, training audiences, and training prerequisites.

Observations of the test bed units and data collected from their record-keeping systems revealed the following information about the training environment between June and December, 1995 that relates to the development of CATS:

Use of Simulations and Simulators

- Among constructive simulations, JANUS was widely used and exercises conducted using this medium were regarded as successful. The Corps Battle Simulation (CBS) was used less frequently, but was also well regarded. The Brigade/Battalion Battle Simulation (BBS) was used much less often than JANUS and these exercises were not particularly successful.

- Among virtual simulations and simulators, the UCOFT (for the M2/M3 and Advanced Matrix for the M1A1) was consistently used to good effect. Some test bed units initially had trouble interpreting the gate exercises, but all were using them correctly by the end of 1995. Software upgrades to the Platoon Gunnery Trainer (PGT; only available in USAREUR) made the systems unusable for long periods. SIMNET (used only by USAREUR test bed units) was used most effectively by units that were conveniently located to these facilities. Units that had to travel more than two hours to reach a SIMNET facility used it much less frequently. There was some evidence from the Opposing Force (OPFOR) at the Combat Maneuver Training Center (CMTC) that SIMNET training led combat units to attempt to travel too rapidly on the actual CMTC terrain; consequently they failed to detect OPFOR positions. Maintenance problems with aviation simulators and UCOFT devices limited access for some units.

CATS uses Janus and CBS-driven Warfighter exercises extensively. The field results confirm that these simulations, when used properly, are effective training aids. The evidence

regarding SIMNET is cautionary for two reasons: 1) There will be high costs associated with the deployment and maintenance of sufficient systems (of SIMNET, or its sequel, CCTT) to provide the training opportunities called for in CATS; 2) the observations of the OPFOR at CMTC could indicate that users of such simulators may develop bad habits. Carefully developed scenarios for the use of the simulators may alleviate the latter problem.

Training Resources

- Shortages of training resources (particularly, training ammunition) prevented some of the units from conducting gunnery tables, or from conducting training in firing according to doctrinal principles. Some units did not have sufficient Multiple Integrated Laser Engagement System (MILES) sets to conduct task force-level training.

CATS is dependent upon the training events being conducted with the greatest possible realism. Shortages of personnel, combat systems, MILES, training ammunition, etc., will reduce the effectiveness of CATS.

A special analysis was conducted to determine the extent to which the BLTMs would be modified by being based on CATS. The resource requirements for CATS were compared to those of the BLTM, using the armor battalion as an example. The combined arms approach inherent in CATS yielded a much more complete and realistic accounting of training activities to be conducted and time required at each echelon. Compared to the BLTM, the armor battalion CATS, which make extensive use of CCTT, should result in an OPTEMPO saving of about eight percent, when averaged across the two years of the CATS calendar.

Personnel Turnover and Turbulence

- Test bed units experienced turnover rates averaging eight to nine percent per month. Some unit types (Air Defense Artillery, Cavalry) had higher rates of turnover than others (Field Artillery, Mechanized Infantry). Overall turnover did not seem to be significantly influenced by time of year. Only one test bed unit appeared to reduce turnover in anticipation of a CTC rotation.

CATS was developed to accommodate turnover of the average order of magnitude experienced by the test bed units. The fact that some units routinely experienced rates nearly double this level (e.g., 18 percent per month), and some units had single months of 30 percent turnover, suggests that there will be times when CATS may be unable to compensate for turnover.

Sustaining Readiness Within the Band of Excellence

- Only 21 percent of the unit ratings of training readiness (derived from Quarterly Training Briefing assessments of proficiency on mission essential tasks) were at the T-1 level.

- Units tended to employ CATS-like training strategies during the period up to and including a major training event (e.g., EXEVAL or CTC rotation), and their self-assessed readiness ratings also rose during these periods. These readiness ratings declined after major events, due to reduced training activity. Higher overall rates of personnel turnover were detrimental to sustaining proficiency. There was also some evidence that concurrent turnover of the battalion S3 and XO was particularly detrimental to readiness.

The long-range training plans and calendars proposed by the developers of CATS cycle units through sequences of training events that should sustain a level of readiness over time. This type of training paradigm is different from that observed in the field, where units tended to cluster training events around the 'capstone' event, then go into periods of relatively little training activity. A longer term implementation study is needed to confirm that CATS has the intended beneficial effects.

CONCLUSIONS

The model used to develop the CATS is broadly applicable to a wide variety of units as evidenced by the application to 11 combat, combat support and combat service support battalion types and their subordinate echelons. The CATS template facilitates the development, communication, coordination, and resourcing of these task-based training strategies. TRADOC has accepted the CATS template approach to developing training strategies. The TRADOC proponent schools have agreed to accept the responsibility of maintaining the CATS developed for the 11 battalion types: modifying the content of the templates and calendars to reflect changes in doctrine and the availability of new training media.

An early, unvalidated, version of the CATS templates was input to the Standard Army Training System (SATS 4.0). This version lacks many of the refinements based on the reviews by the test bed units and the TRADOC proponent schools. The CATS templates and calendars are being converted to a database format for future use by the Army. Availability of these materials through training management systems should improve unit training management.

Turnover and turbulence have a substantial negative effect on readiness. This effect is especially apparent when units experience periods of relatively low training activity. The CATS prototypes show how to balance training throughout a two-year cycle to moderate the cycle between training surges and slack periods. Such a balanced training program should compensate for typical levels of turnover and turbulence.

The leaders and trainers in the test bed units and personnel in the TRADOC proponent schools agreed that the training programs laid out in the revised prototype CATS templates and calendars are accurate and complete. Several leaders of test bed units stated that the training program in CATS would be very effective. One test bed battalion commander stated that CATS was his "road map to planning and execution of battalion training."

A careful comparison of the task-based CATS with the earlier event-based BLTM for the armor battalion showed that the integration of TADSS proposed in CATS could result in a reduction of about eight percent of the combat vehicle mileage over a two year training cycle. Some of the TADSS proposed in CATS (e.g., CCTT) have not yet been delivered to the units, so there are unanswered questions about their training effectiveness and the costs associated with their maintenance. If the TADSS are accompanied by appropriate training support packages they should prove to be effective.

If units were resourced to execute CATS, and if they were to execute these training strategies, they should be at training readiness level T-1 with respect to missions and tasks inherent in mid-intensity conflict (MIC).

COMPREHENSIVE REPORT ON THE PREPARATION OF VALIDATED TRAINING STRATEGIES FOR ARMY BATTALIONS

INTRODUCTION

Background

The break up of the Soviet Union has radically changed the nature of the threats faced by the U.S. Army. As the Soviet threat has diminished, it has been replaced by the possibility of simultaneous involvement in mid- to high-intensity conflict in two separate regions. At the same time, requirements of the U.S. domestic economy have led to pressures to reduce the military budget. To maintain a combat ready force, tailored to the most likely threats, the Army must optimize its use of training resources.

As part of the comprehensive project examining Determinants of Effective Unit Performance (Holz, Hiller and McFann, 1994), Keesling, Ford and Harrison (1994) indicated that realistic field training, which is expensive, was critical to unit readiness. Since the data for that project were collected, the M1A1 Unit Conduct of Fire Trainer (UCOFT) has been upgraded (Advanced Matrix), and Janus and SIMNET (simulation network) have become more widely available to combat units. These simulations and simulators are capable of training certain tasks with a high degree of realism. Additional simulators are under development.

Presently, resourcing for training is based upon the Battalion Level Training Model (BLTM) for a particular unit type. Each BLTM describes the number of times particular training events (e.g., a Field Training Exercise, or FTX) must be conducted in the course of a year to sustain unit readiness. These models do not describe the tasks to be trained during the exercises; they do not suggest a sequence for the exercises; they do not describe how to use training aids, devices, simulators and simulations (TADSS: e.g., Janus, SIMNET) available to the units; they do not include platoon-level training; and they use the same exercises for every battalion type. Furthermore, there is little objective evidence that units conduct the events contained in the models, or with the frequency the models specify.

The Office of the Deputy Chief of Staff for Operations and Plans - Training (ODCSOPS-TR) is revising the BLTMs to make maximum use of the existing inventory of TADSS as well as future developments (e.g. the Close Combat Tactical Trainer, or CCTT). The new BLTMs will be based on combined arms training strategies (CATS). CATS are task-based training strategies, rather than event-based. They provide more complete descriptions of training: identifying the tasks to be trained by each event at each echelon, and laying out a menu of events and media that may be used to train the tasks. A more complete discussion of the CATS is found in the subsequent section titled, "CATS Development."

ODCSOPS-TR asked the Army Research Institute (ARI) to manage the preparation and validation of the CATS in two phases:

Phase 1. Develop the CATS for 11 different battalion/squadron types:

- Air Defense Artillery Battalion (Avenger)
- Air Defense Artillery Battalion (Heavy)
- Armor Battalion Task Force
- Assault Helicopter (UH-60) Battalion Task Force
- Attack Helicopter (AH-64) Battalion/Squadron Task Force
- Cavalry Squadron (Heavy Division)
- Engineer Battalion, Engineer Brigade, Heavy Division
- Field Artillery Battalion (155mm Self-Propelled Howitzer)
- Field Artillery Battalion (Multiple Launch Rocket System)
- Forward Support Battalion (Heavy Division)
- Mechanized Infantry Battalion Task Force

These types of battalions collectively account for 60 percent of the operating tempo (OPTEMPO: the mileage or hours on the unit's base item of equipment required for one year of training) costs for the Army. Sound, task-based training strategies for these units should improve training and provide a firm foundation for the Army's OPTEMPO projections.

Phase 2. Validate the CATS with three stakeholder groups: the proponent schools, battalion commanders in test bed units in Forces Command (FORSCOM), and battalion commanders in test bed units in US Army Europe (USAREUR).

The nature of this validation was to obtain concurrence that the CATS for each unit addressed the correct set of tasks, used an appropriate mix of field and TADSS events, accurately described the training audience and prerequisite training (training 'gates') for each training event, and described a training program that would sustain unit performance given current levels of turnover and turbulence. Additional information was to be obtained by observing the test bed battalions' training practices after they had been exposed to CATS.

Phase I resulted in the development of prototype CATS for 11 different battalion types. These strategies are aimed at producing units that are at training readiness level T-1 with respect to missions and tasks inherent in mid-intensity conflict (MIC). Although Army regulation specifies that T-1 units are supposed to be deployable within 14 days of notification, a more stringent requirement was set for CATS development: units are to be deployable within five days of notification. This requirement was imposed to be sure that units implementing CATS would meet the regulatory requirement. Phase II met the goal of validating these strategies. Additional objectives for Phase II were:

1) to prepare a guidance document focused on the unit commander using the templates to develop a training program for a particular unit,

2) to input the CATS into the Standard Army Training System (SATS), and

3) to provide data on resources used in training to DSCOPS-TR for use in projecting the costs of implementing the training models.

Overview of this Report

This document is a comprehensive report concerning the development and validation of CATS for the 11 battalion types listed earlier. The remainder of the report is divided into three chapters. Chapter 1 discusses the development of the strategies and provides details about the template used to structure the developmental process. Associated with this section are three appendices: Appendix A is a User's Guide directed primarily at the battalion commander using the template to design a training program; Appendix B is a list of the training strategies and calendars completed in Phase I and validated in Phase II; Appendix C is a sample table of contents from the Armor Battalion Task Force templates.

Chapter 2 develops a framework of five questions that were used to guide data collection and analysis during the validation phase. This section discusses some of the difficulties with data collection efforts and examines the reasons why it was not possible to conduct a rigorous formative and summative evaluation of the strategies.

Chapter 3 describes the data collected and analyses performed to answer each of the five questions in the analysis framework. The response to each question consists of a presentation of the relevant data followed by a discussion with conclusions. Two appendices provide supporting data and additional analyses: Appendix D is a summary of the effort to input the CATS into the Army's SATS, focusing on the difficulties in making this transition and the implications these have for representing CATS within SATS.

CHAPTER 1. CATS DEVELOPMENT

Background

The CATS are a part of the larger operational readiness (OPRED) initiative of the Department of the Army (DA) to more effectively program, explain and resource Army readiness requirements. OPRED requires a training model and training strategy consistent with the training management doctrine established in FMs 25-100 and 25-101. In order to accomplish this task the Army needed to update the Battalion Level Training Models (BLTM) which fed the Training Resource Models (TRMs) which in turn provided Army training resource requirements to the Department of Defense. BLTM is the methodology to relate training activities to recurring operating and support costs in a manner consistent with the tiers of unit status reporting resulting from different levels of operating tempo (OPTEMPO) expenditures. Development of CATS was the approach selected by DA to update the BLTMs with training strategies reflecting integrated training resulting in combined arms proficiency along with accurate event descriptions reflecting required time and resources, as well as, use of current and developmental training aids, devices, simulators, and simulations (TADSS).

The Office of the Deputy Chief of Staff for Operations and Plans Director of Training (ODCSOPS-TR), the Army Staff proponent for CATS, conceived the development and validation of CATS as a two-phased project. In the first phase, the ten most OPTEMPO-intensive BLTMs were to be examined and a new model based on CATS proposed for each. These ten battalion types were selected for study because they consume 60% of the Army's annual OPTEMPO budget.[2]

In the first phase, the initial step in developing CATS was to set the inclusive parameters for a model strategy and get approval for its content. The development of strategies for 10 different types of battalions could then begin with common requirements. In the next step the candidate strategies were then developed and presented in common CATS model templates as well as prototype unit two year calendars to demonstrate the implementation of the model and suitability of the strategies.

In the second phase, the prototype CATS for the 10 battalion types would be 'validated' in the sense that training developers at the appropriate Training and Doctrine Command (TRADOC) proponent schools and leaders of test bed battalions in both FORSCOM and USAREUR would agree to the soundness of the strategies. Test bed units were expected to attempt to implement CATS (within their means and subject to other demands). During this phase the CATS model, templates, or strategies would be refined to reflect actual training events and input from personnel in the test bed units, particularly any ideas they had about better ways to conduct training.

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[2]During the course of the study, a CATS for an eleventh battalion type, heavy division ADA battalion (STINGER/BFV), was developed in addition to that for the Avenger battalion reflected in the statement of work.

Initially, the bases for the strategies were three tactical maneuver missions performed by armor and mechanized battalion task forces (movement to contact, attack, and defend). Subsequent discussions with test bed units and proponent schools led to the inclusion of 'conduct assembly area operations' and 'conduct tactical road march' as additional missions because of their universal applicability. The additional combat, combat support and combat service support battalion strategies were to be developed for the missions they perform in support of these ground maneuver missions.

ODCSOPS-TR established several specific principles to characterize the proposed CATS model.

- The readiness objective of the model is for a battalion to achieve and sustain a T-1 rating and remain ready to deploy in 5 days when fully resourced to execute the CATS.

- The CATS model must address the reality of unit turbulence and turnover and address the associated training problems.

- The CATS model must be able to support training strategies for units that are at a near zero base of training proficiency.

- The CATS model must use effective combined arms training as its focus.

- The CATS model must be based on realistic allocation of time for unit training. Therefore all facets of unit life and training must be considered and addressed.

ODCSOPS-TR also provided three general objectives to direct the incorporation of present and future training guidance, planning, and materials into the strategies.

- The CATS should utilize materials and concepts from training programs that are currently operating in the test bed units.

- The CATS should retain and support as much as possible the current training doctrine and materials developed by TRADOC proponent schools.

- The CATS should emphasize the integration of innovative training techniques, developmental methodologies, simulations, simulators, and field training. In particular, CATS should make use of existing TADSS and those planned for near-term deployment to units.

Technical Approach

ODCSOPS-TR tasked ARI to provide technical oversight for the project. ARI initiated contract negotiations with BDM, and by October 1994, ARI and ODCSOPS-TR had approved the contractor's proposal. The major milestones consisted of the following five points:

1. A small group of experienced Army trainers composed of recently retired brigade commanders, guided by the principles provided by ODCSOPS-TR, would review the shortcomings of current models (e.g., BLTM) and would develop a detailed prototype CATS model. The armor task force would be used in the prototype. Milestone: NLT January 1995.

2. After approval of the prototype, additional SME/analysts would be recruited and trained to conduct a functional analysis of the training requirements for each of the 10 battalion types. They would be guided by the data elements of the model and the objectives provided by ODCSOPS-TR. In coordination with the TRADOC proponents, they would develop CATS for each battalion type. Milestone: NLT May 1995.

3. To ensure a detailed review of these strategies, the SME/analysts would coordinate with TRADOC proponent schools and FORSCOM/USAREUR unit leaders as they developed and refined the CATS model. Milestone: NLT June 1995.

4. ODCSOPS-TR would conduct review boards with each test bed unit in USAREUR and FORSCOM. ODCSOPS-TR, TRADOC, ARI, and the test bed units would comprise the membership of these review boards. (Also, the test bed units were to accept the mission of implementing these strategy prototypes upon completion of the review boards.) Milestone: NLT August 1995.

5. Upon completion of the foregoing, unit implementation of the CATS and validation would begin. Milestone: August through December 1995.

Chapter 2 provides details about the conduct of the validation phase. Chapter 3 gives the results of the validation phase.

Study Phase One, Step 1: Development of the CATS Model

The first objective in the development of CATS was to construct a prototype model. This model had to be responsive to the principles and objectives provided by ODCSOPS-TR. The armor task force was used as the base case to prove the concept. The goal was to develop training model that would permit the Department of the Army to link resource expenditure to measurable unit training proficiency requirements and then to combat readiness as described in AR 220-1. Several substeps were undertaken to develop the prototype model.

First, the training mission and "How to Train" doctrine were reviewed and analyzed to ensure understanding and to update the analysts as necessary. This began with a review of the training mission, supporting training literature, and the training environment of an armor battalion task force. This review provided a basis for understanding the totality of the training challenge faced by units. The group conducted a detailed review and analysis of current training doctrine in FM 25-100; FM 25-101; FM 71-123; ARTEP 71-2-MTP; and supporting company/team, platoon, squad/crew, and individual training manuals. The analysts also interviewed trainers at the Armor Center, and current and former battalion commanders. In addition to the insights gained into current training issues, this research concluded that:

- The literature listed above provides a clear and coherent training doctrine for a systems approach to training the force; it provides the necessary guidelines on how to plan, execute, and assess training at all levels.

- The basis for all unit training and training management is achieving proficiency in wartime missions/tasks; the commander's assessment of the current proficiency level determines future activities.

- All training must be based on the performance oriented training model of -TASK - CONDITION - STANDARD (TCS).

The study team also concluded that an in-depth understanding of performance-oriented training and the interactive relationship between doctrinal mission, training task, conditions, and standards is critical to understanding the required connection between planning training and modeling resource allocation. For example the analysts were certain that the FM 25-100/FM 25-101 system of "Battle Focused" training management was fully in use by the armor community in the field for training planning. However, "event or time-focused" models seemed to be in use for resource allocation and long term planning. Although it was too early in the study to reach a firm conclusion about this, the disconnect between planning and resource allocation did appear to be the very foundation of the problem at which the study was directed.

The second substep was to examine the CONUS/OCONUS environmental training challenges. This step required a review of the discrete environments within which units actually lived, worked, and trained. In addition, it was necessary to determine how III Corps and V Corps, the two major tactical commands in which the CATS would be validated, communicated training guidance to provide goals and objectives for their units and then allocated the training resources to meet this guidance.

The study team, along with representatives from ARI and ODCSOPS-TR, visited headquarters, III Corps and the two divisions located at Fort Hood to conduct a three day seminar directed at understanding the current training environment at the major tactical command level and determine the methodology for allocating resources at the corps level. The focus on this echelon was critical because the analysts and ODCSOPS-TRO were convinced that the corps is the first command level from the top down that must allocate resources based on actual

assessments of unit proficiency. The three day seminar was supported by attendance and involvement of ODCSOPS-TRO staff officers, the III Corps Chief of Staff, the Corps G3 and G3 training officer, and the G3s and G3 training officers of both on post divisions. Key members of the corps and division staffs gave the group a detailed description of the III Corps training strategy, training guidance, and the basis for resource allocation. The fundamentals of the III Corps concept of the training environment fit exactly with the analysts' interpretation of FM 25-100. These are illustrated very effectively using a modification of "The Band Of Excellence" (figure 1-2 of FM 25-100), reproduced as Figure 1, "The Training Challenge".

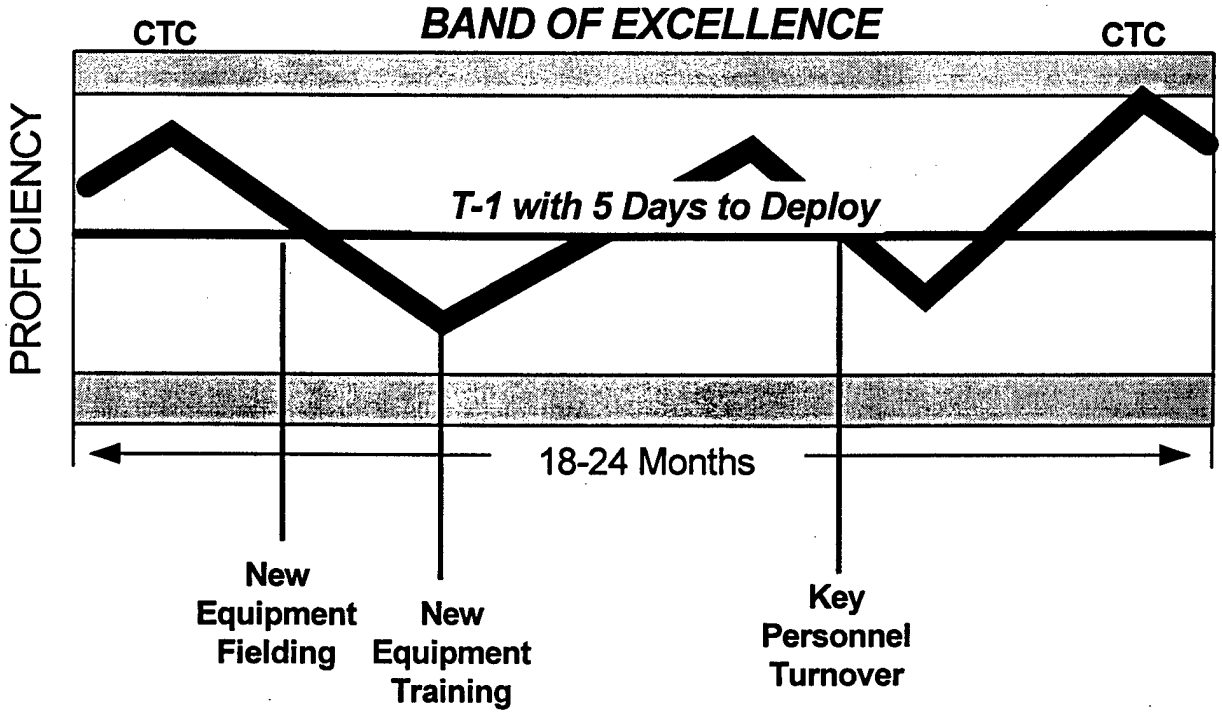

Figure 1. The Training Challenge

This figure illustrates the concept of "The Training Challenge" identified by the study group as its mission in terms of the objectives established for the CATS model and the environment to be modeled. This concept was later briefed to the Commanding General and selected staff members of the V Corps and Commanding General, Seventh Army Training Command. All concurred that it was an accurate reflection of how they viewed the readiness objective and the allocation of resources to accomplish that objective . The principles of "The Training Challenge" are:

- The time period for long range planning is 24 months.
- The common multi-echelon assessment which field commanders depend on for resource allocation and readiness determination, from corps through battalion, is a CTC rotation or actual mission deployment.

- The unit is at peak proficiency after a rotation to a CTC or actual deployment.

- The unit commander and his subordinate leaders most accurately know their proficiency level by mission or task after the rotation to a CTC or actual deployment.

- The unit commander and his subordinates must have a shared view of the conditions of combat after a rotation to a CTC or actual deployment. (NOTE: At the time of these discussions III Corps and V Corps had units deployed in Haiti, Panama, Macedonia, and Kuwait. This additional experience only further confirmed in all commanders' minds that the detailed feedback and evaluation from either a CTC or actual deployment are critical requirements at least every 12 to 24 months.)

- Over the 12-24 month period between CTC events, the commander's challenge is to ensure his unit retains or improves the level of proficiency attained during the CTC rotation in order to be prepared to go to war or return to the CTC for another training event and assessment.

- The addition to the band of excellence of a mean value represented by "T-1 ready to deploy in five days" identifies a readiness objective for the commander's training strategy that allows him to stay in the T-1 range consistently.

At the conclusion of the research, seminar, and briefings of both corps described above, there was complete agreement that the foregoing was a clear articulation of reasonable, effective guidance from a commander to a subordinate unit commander to provide a clear common basis for training guidance and readiness requirements against which resources can be allocated.

The third substep taken to develop the prototype Armor Task Force CATS model was to identify the essential data elements of the model. The study group determined, based on the training mission analysis, the survey of the training environment, and the concerns of the ODCSOPS-TR about resource management, that there is not an effective relationship between OPTEMPO resource allocation and the BLTM execution. It was determined by the study group that this is the case because current resource models do not use unit proficiency as a basis for resource allocation and do not link resource consumption to increased proficiency or readiness. The proposed CATS model is intended to establish a triangular connection between "battle focused" training management, resource allocation models, and unit performance/readiness.

The data elements of the CATS model were determined based on the unit training system (FM 25-100) and the concept of resource allocation and training guidance currently in use by the major field commands. Analysis of "The Training Challenge" indicates that its dominant component is task-based proficiency, which forms the vertical axis of the diagram; the points along the curve illustrate a commander's spot estimates of his unit's level of proficiency over time.

Unit proficiency is the basis of the training system. Doctrine defines proficiency as the ability to perform critical unit tasks to standard; all management and planning decisions are based on the commander's assessment of task proficiency. In Figure 1 the movement along the curve up and down over the horizontal axis of time reflects changes in the commander's view of the unit's proficiency. The commander measures proficiency in terms of critical or mission essential task performance as he views it over time. Therefore, the first or base data element of any model attempting to determine training requirements to achieve proficiency must be the unit's critical missions/essential tasks.

As the study group continued its analysis, it also became clear that, in practice, the Army accepts that there is a time interval between training tasks, which if exceeded, leads to a decline in proficiency. The analysts and unit commanders they consulted were certain that this decline is caused by either simple skill decay over time or the turnover and turbulence of key personnel. Further, an estimate of the interval which can be tolerated before it becomes essential to again practice a task can be determined. This interval can be estimated accurately enough to insure that the unit has sufficient resources to establish frequent enough training sessions to stay within the band of readiness in all critical missions/ essential tasks. Therefore, determining the elements of frequency and required interval over a fixed period became another essential data element in the training strategy.

The illustration of "The Training Challenge" also indicates that some type of effectively planned, well executed training event or practice activity is required to sustain or move the unit up the proficiency curve. These training events have various names in the Army's approved or commonly used field lexicon. In many cases exercise titles found in field usage reflected a training media or device. The analysts saw a clear need to articulate both the training event, including assessment, and the discrete training media (TADSS) used in a manner descriptive enough to identify specific resource requirements associated with training task proficiency. The term *means* was selected for this articulation. *Means* allows the establishment of event definitions consistent with FM 25-100, permits the specific integration of TADSS with the event, and logically requires the assessment aspect to be highlighted. From a modeling or strategic perspective, the term conveys the concept of a choice of how to achieve improved proficiency, the strategic goal. The *means* clearly is a critical data element of the strategy and more precisely describes resource combinations that are required to improve or sustain proficiency.

"The Training Challenge" model also requires an understanding of time as a primary resource. The critical question is not only total time in terms of 24 months. That figure is important and was selected based on command tour lengths, timing of CTC rotations, and a clear understanding that a long term view was required to see the complete mix of training that takes place in a battalion's cycle of training. As important as the long-term view are the key measurements of time associated with executing a particular training event/media combination, or in other words, the duration of a given training *means*. This period of time must be sufficient to improve or sustain proficiency and still be an efficient use of unit time. Thus, the duration data element is the specific time to train a task to standard with all the components of good training practice including repetitions required to meet standards and conduct the after action

review (AAR) processes. In this manner the time resource requirements are realistically accounted for and can be aggregated in long and short term training plans.

As analysis and discussions of what data elements should compose the CATS model continued, two other concepts not directly illustrated in "The Training Challenge" diagram, but key to the development of a resource allocation model, were identified. The training unit or audience to be trained is a key data element for identification of resources in terms of unit personnel and equipment needed to execute a specific means. It is also necessary to identify the gate tasks or prerequisite skills that must be demonstrated before a certain means can be used or task can be trained effectively. These data base elements both link other unit echelons and other type battalions into the model. Both data elements are essential to a combined arms training model.

Finally, the last data element identified for the model was "Means *Quality* Rating". This was necessary to permit the Department of the Army and trainers to identify the usefulness of certain *means* to serve the full range of purposes required in an Army level multi-echelon unit training program. Simply stated, there can be many levels of CPXs and FTXs in an annual training plan. These levels of events have different resource requirements. This is because the training objective for a given means usually varies by task or audience. The *Quality* rating concept permits illustration of the variable value of the *means* in each type unit training plan. The value is the measure of training fidelity generated by the means used which directly contributes to the commander's confidence, based on the event/media used, in assessing unit training readiness to accomplish the task(s) trained.

At the conclusion of this preliminary research, analysis, and discussions with the field, the study group had developed a prototype model. It consisted of seven data elements arranged in matrix format with a remarks column added to clarify data or highlight interaction between elements as shown in Figure 2 below.

Task	Freq/ Interval	Means (Event) (Media)	Estimated Duration	Quality (A-D)	Training Unit (Audience)	Prerequisite Training (Gates)	Remarks (Includes purpose of event; outcome being supported; comments about execution of the event/constraints posed by TADSS/ et al)

Figure 2. CATS Model Data Elements

This matrix format was used to address echelons and training tasks not elaborated on in detail by current Army training publications. In the initial attempt to identify the training requirements for a type unit, it became very clear that a common concept of unit organization was needed for the CATS matrices. It was decided that, for purposes of training management and task analysis, a unit (battalion) would consist of five subordinate echelons to be trained: battalions/squadrons (as an entity greater than a mere collection of their parts), staffs,

companies/troops/batteries, platoons/sections, and squads/crews. (Individuals proficiencies are noted as gate tasks to squad/crew tasks.)

Expansion of CATS coverage to all activities undertaken by units was required in order to address the ODCSOPs requirement that "The CATS model must be based on realistic allocation of time for unit training. Therefore, all facets of unit life and training must be considered and addressed." Based on this, "Deploy" and "Sustain" were added as categories of tasks to be covered by the CATS with the result that all tasks included in the model for each echelon would be grouped into one of three major functional categories in which the unit may be engaged: Deploy/Redeploy, Fight, and Sustain. An implicit aspect of the CATS strategy which was endorsed and confirmed during the project was that every activity a unit schedules should be expressed within one of these three categories.

At this point in the study group's research and analysis, all of the parameters of the entire model had been identified. The three major categories of unit activity, type unit missions/tasks, five organizational echelons for training, and the eight matrix data elements which interact to effect unit proficiency and readiness became the basis for the CATS model architecture. This model was presented to the field commanders and to TRADOC proponents and was universally accepted. Figure 3 is a graphical representation of this architecture.

The final substep in the initial development of the prototype CATS model was the determination that task proficiency should be the basis of the model. Over the years, the Army has based models for training management on different factors. Time-based (number of hours or days training), mileage-based (distance moved), event-based (number of events resourced in a given cycle), and resource consumption-based (OPTEMPO) and so on. All were considered in this study. The choices were extensively studied and discussed. The key reasons for basing the CATS on task proficiency follow:

- Basis on tasks is consistent with current training doctrine, FM 25-100/101. The emphasis of "battle focus" training is on the commander selecting his unit's essential tasks from a mission analysis, assessing their skills, and then planning and executing training strategies to improve proficiency.

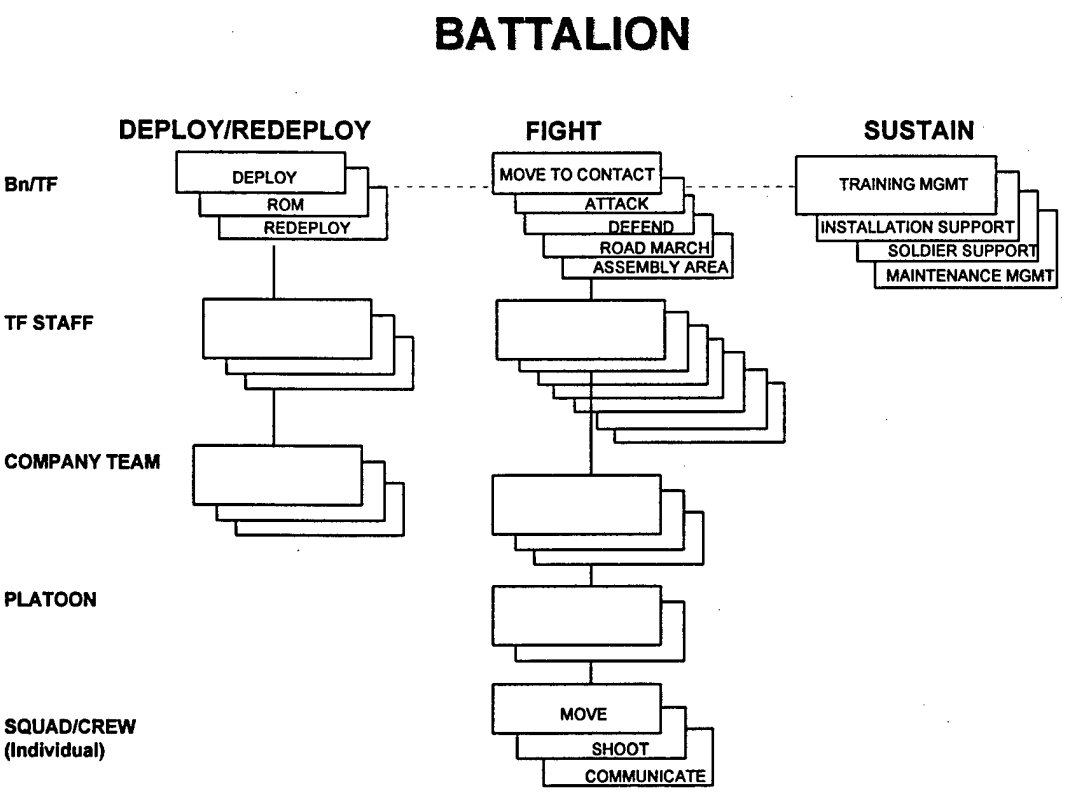

Figure 3. The Final CATS Template Architecture

- The task-based model permits the Department of Army to tie resource allocation to unit task proficiency. Instead of providing resources for particular events, the resources are provided to implement a strategy to improve skills, maintain proficiency in certain tasks, or to improve mission readiness in preparation for deployment -- all based on a unit commander's assessment. If resources are reduced below the fully resourced level, the unit will not be as proficient in all missions/tasks at all times.

- Basing CATS on tasks retains the commander's flexibility at all levels. The commander's flexibility, derived from his capability to make assessments, permits generation of unity of purpose.

- The task basis permits the commander to organize multiple tasks inside an event or set of events. Unit training can be fitted inside higher unit training events. The entire range of TADSS is available to the commander from which to select means.

Based on the foregoing, the armor task force's fight template for movement to contact was developed. The template provided a prototype for use of the model's parameters as presented in this report. Figure 4 is an extract from this template.

ARMOR BATTALION TASK FORCE

FIGHT **COMPANY/TEAM**

Mission/ Tasks	Freq/ Interval	Means Event (Media)	Estimated Duration	Means Quality A-D	Training Unit Audience	Prerequisite Training Gates	Comments: (Includes purpose of event; outcome supported; remarks about execution of the event; constraints posed by TADSS/et al)
MOVEMENT TO CONTACT/ATTACK							
PERFORM TACTICAL MOVEMENT (17-2-0301) The situational context of Tactical Movement operations and related tasks is determined by the commander's METL assessment as discussed in FM 25-100. ARTEP 71-1-MTP tasks that may be included are: 17-2-0301; 17-2-0302	12/Monthly (Events must include 2 FTXs and 2 STXs. Eight other events are selected from the Means column)	2 - FTX 1 - FTX (MILES - Done as part of TF EXEVAL) 1 - FTX (MILES - Co/Tm EXEVAL done as part of TF FTX (FTXs may include embedded STXs))	4 Hours (Time based on tactical scenario. Includes time for plan, prepare, execute, AAR, and repeat of execution phase as necessary. Additionally, a Bn level Road March will be conducted as part of each FTX)	B	Full Co/Tm w/all systems (incl FIST & any other attachments)	Subordinate forces and leaders are assessed at "T" level in all supporting tasks: **Company & Attachments** - 17-2-0201, 0301, 0302, 0303, 0313, 0314, 0329; 44-2-C001, C002. **Co/Tm Cdr/XO** - 01-1240.00-0018, 0019; 04-3312.03-0021. **Tank Plt** - 17-3-0105, 0201, 0202, 0203, 0204, 0205, 0206, 0207, 0208, 0209, 0210, 0211, 0301, 0603;03-3-C013, C015, C034; 44-3-C001, C002. **Tank Plt Ldr** - 01-1240.00-0031, 0039. **Tank Plt Sgt** - 171-091-3009, 4015, 4017, 4030, 4053, 4054, 4007, 4009. **Mech Plt** - 7-3-1029, 1035; 7-3/4-1025, 1028. **Mech Plt Ldr** - 04-3312.02-0008, 0009.	**PURPOSE:** The purpose of the FTX is to confirm and enhance Co/Tm proficiency for mission planning, preparation, and execution of Tactical Movement. **OUTCOME:** The Co/Tm can successfully plan, prepare, and execute a Tactical Movement under high fidelity simulated combat conditions. **REMARKS:** This event is fully resourced and supported with appropriate equipment, personnel, and land, as well as OPFOR and OCs. Troop leading procedures, orders, rehearsals, and other readiness activities are embedded in the scenario. Operations are conducted continuously for the duration of the exercise (day/night) at a run pace. AARs are conducted at appropriate intervals.

Figure 4. Extract from armor battalion CATS template.

The CATS prototype, illustrated with a complete offensive mission, was presented on 17 December 1994 to BG Stewart W. Wallace, then the ODCSOPS-TR. The model was approved as briefed. The study group progressed to the next step.

Phase One, Step 2: Overview of Development of Battalion CATS and Model Refinement

The second step of phase one was to create training strategies for each type battalion through a detailed functional analysis and development of the data to complete the fields/columns of the template. Additional subject matter experts (most of whom were former brigade and/or battalion commanders of the type battalions; all were subject matter experts by branch and experience) were assembled and trained to develop the training strategies for the following primary maneuver missions:

- Movement to Contact
- Attack
- Defend
- Conduct a Tactical Road March
- Occupy an Assembly Area

The SME/analysts for combat, combat support and combat service support units developed training strategies for the missions and tasks that support these maneuver task force missions. The CATS model template was used to describe the results of analyses of the training strategy appropriate to each battalion and its subordinate organic units and attached elements. Throughout the development process, the SME/analysts coordinated with each other, with TRADOC CATS proponents, and with field commanders of both FORSCOM and USAREUR units.

As the study progressed, it became obvious that the next three milestones (develop the prototype CATS, coordinate with TRADOC and the units, and conduct the review boards) should be pursued concurrently. It also became apparent that this approach would have to include continuous refinement of the initial model. This does not mean substantive changes to the model data elements began to occur, but rather that a continuous refinement of the definition of the data ensued. Thus, a consequence of the diverse nature of the type battalions became a true strength of the CATS model and strategies. The necessity to coordinate the data elements across 11 very different organizations greatly expanded the utility of the model. The remainder of this chapter provides a description of the final definition of each of the data elements in the model.

Final Definition of Each of the Cats Model Data Elements

Column One: Mission/Task

Because the CATS are task based, this data element is the keystone entry in the model. Thus, the important information to provide for this element is: what tasks were selected, why, and what were the source documents?

TRADOC mission training plans (MTPs) were the primary source of all tasks identified by each SME. The MTPs' reflection of the TRADOC proponent analyses of the tactical missions and the tasks performed by each of the organizational echelons (squad/crew tasks, platoon/section tasks, company/battery tasks, and battalion/squadron tasks) provided the most fully developed doctrinal baseline available. The SME/analysts used the appropriate MTP for each unit echelon. It was clear that the tasks should be organized into a task hierarchy based on a likely tactical sequence and prioritized into major tasks and subtasks based on a functional or mission outcome. Some MTPs did provide this type of organization in mission outlines and/or FTX/STX outlines. However, it was necessary for each SME to create a generic mission analysis, organizing the training tasks in a battle phased sequence with a logical and functional task hierarchy. Using this approach the SME/analysts were able to develop major tasks for the

battalion echelon which led to a series of clearly related intra-echelon subtasks by mission and inter-echelon subtask requirements for lower echelons. This top down approach is illustrated for the Company/Team attack and tank platoon attack/movement to contact in figures 5 and 6.

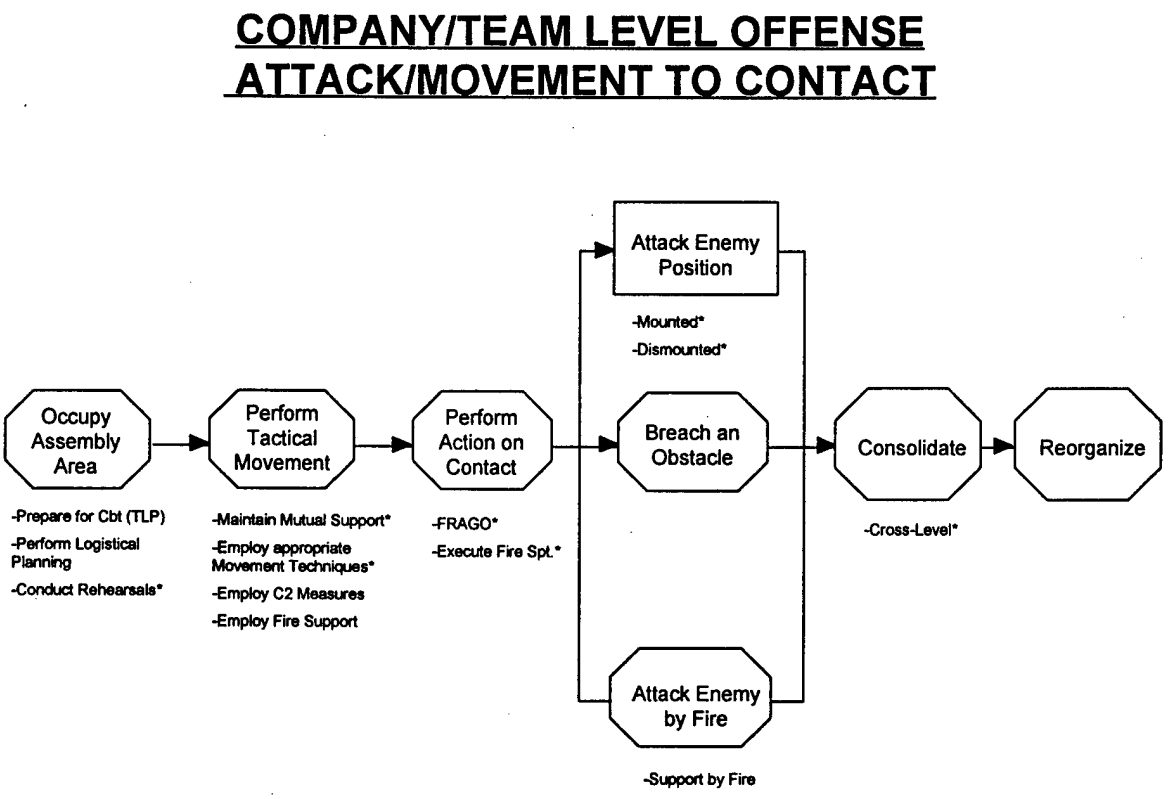

Figure 5. Example: task/subtask organization at company level.

In the above example, the offensive task has been organized in battle phases. The tasks in octagons or squares are the major tasks for each battle phase. Those shown as octagons are tasks currently listed in the MTP. Those shown in squares are tasks not currently listed in the MTP. For example, 'Attack Enemy Position' is not currently considered a separate task while 'Mounted and Dismounted Attacks' are listed as MTP tasks. (The number of "new" tasks and subtasks not contained in the MTP but identified as necessary to the CATS by the SME/analysts varied by type unit and the maturity of the MTP. Such tasks are listed in column one of the CATS template as XX-XX-XXXX tasks with a proposed task title.) Shown below each of the major tasks above are the subtasks that should be practiced during the training of that major task. While many tasks are listed in the MTP as separate tasks with no particular or consistent hierarchy, the makers of the study group used this analysis of the hierarchy of tasks to identify critical training tasks and their relationship with other tasks. The methodology takes advantage of a research concept called "task nesting" which permits effective utilization of training time,

more precise training management, and more accurate leader assessments of strengths and weaknesses.

In the platoon example below, the offensive task has also been organized in battle phases. As above, the tasks in octagons or squares are the major tasks. As with the company, some tasks were added and some tasks logically became subtasks. Also note that there is a clear relationship between the tasks identified at platoon and company level. While the platoon leaders focus on movement of and massing fires of direct fire systems, the company commander maneuvers platoons and integrates direct and indirect fires.

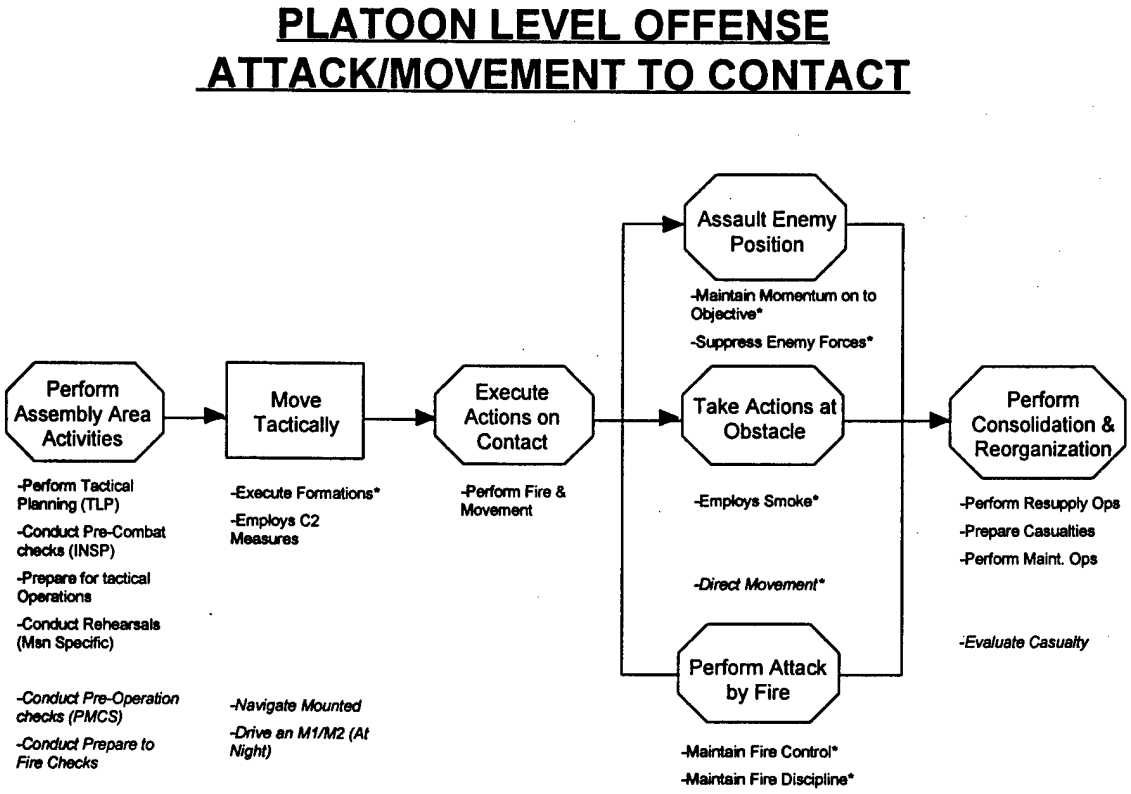

Figure 6. Example: task/subtask organization at platoon level.

The same methodology was used at the battalion level. The lower half of Figure 7 shows the maneuver tasks by battle phase for a battalion offensive operation. When the SME/analysts studied the training tasks necessary to accomplish those major tasks, virtually all of those maneuver tasks listed were trained when the companies and platoons of the battalion trained their critical tasks. However, the task analyses demonstrated clearly that the staff and appropriate staff tasks shown on the upper half of the diagram needed to be understood and identified as critical tasks at the battalion level for all 11 type units. This assessment was reinforced and further amplified during analysis of CTC lessons learned and in interviews with current commanders.

BATTALION/TASK FORCE LEVEL OFFENSIVE OPERATIONS

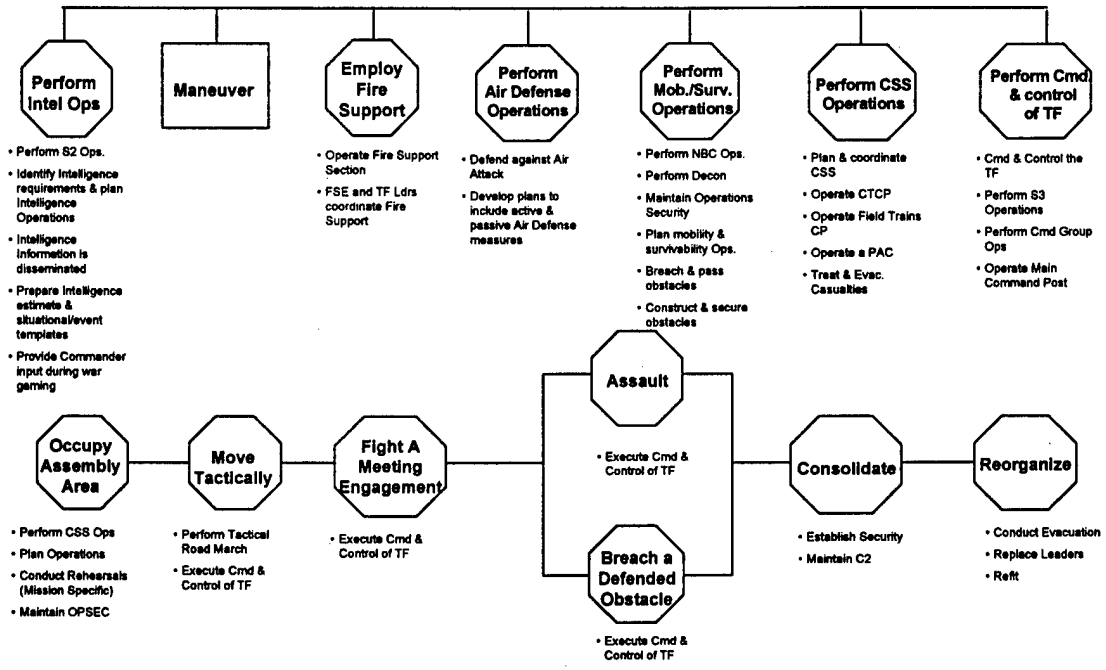

Figure 7. Example: task/subtask organization at battalion/task force level.

The MTP for the Armor/Mechanized Task Force is the source of the staff tasks shown in this figure, additionally the tasks have been categorized by battlefield operating system (BOS). It is possible to differentiate between staff tasks and subordinate unit tasks when analyzing battalion operations. The tasks listed under 'maneuver' in a maneuver battalion/squadron are not actually performed by the battalion staff; they are accomplished by the subordinate units (the square function in the diagram). The staff tasks that occur at the battalion level which influence maneuver are the command and control and BOS synchronization tasks. This is also the case in the other type units. For example, artillery battalion staffs didn't employ fire support, their batteries and platoons did; the battalion staff was focused on tasks which were generally in the function of command and control.

It also was clear that the critical tasks trained at the staff level were functionally the same in the offense, defense, assembly area or on a road march. Therefore, it was decided to conduct a front-end functional analysis to identify the range of tasks required for the CATS. The front-end analysis of each battlefield operating system (BOS) for each type unit indicated that the tasks necessary for staff proficiency were not well defined by MTPs and that inter-BOS and intra-BOS relationships were not well understood. This led to the identification and use of a series of BOS-

related staff tasks which are almost independent of battalion type and which represent functions performed in virtually every type of mission the unit conducts. This staff task list is included in each CATS and is illustrated in Figure 8.

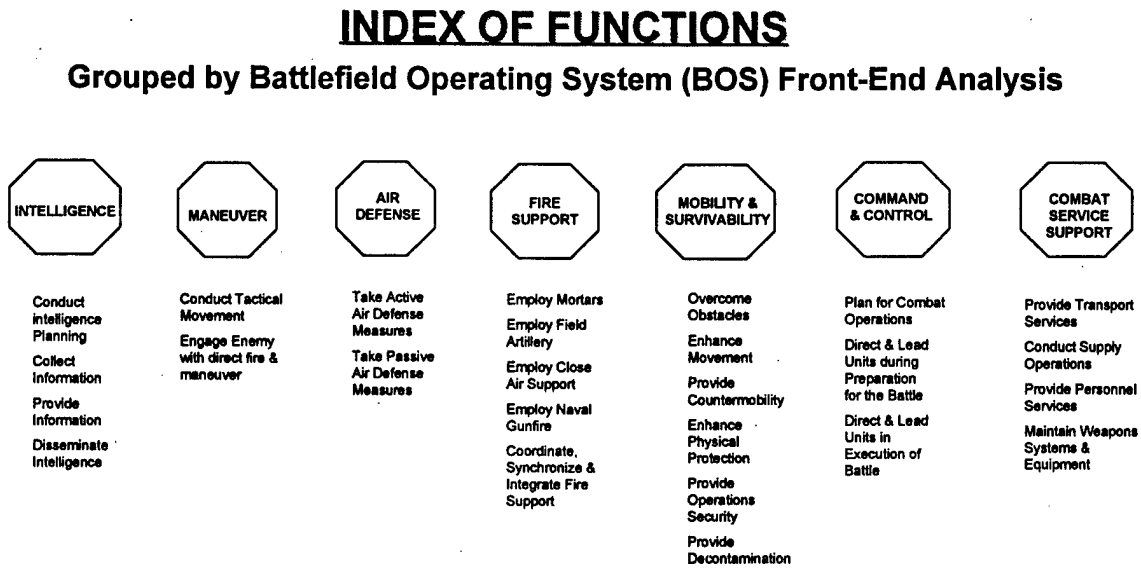

Figure 8. Staff functions.

The functions listed permit the development of staff tasks with measurable product outcomes by BOS. The components of the staff require individual and collective skill proficiency including coordination tasks between and among staff groups. As a result, each of the CATS was expanded to include a unique paradigm for staff training. This paradigm starts with section level training and includes individual and section functions, responsibilities, etc. It progresses to staff group training with interaction between various staff sections, and culminates in a staff exercise (STAFFEX). Then finally the staff is trained with the entire battalion.

Accordingly, the CATS templates provide a clear and concise set of recommended training activities for battalion staffs not previously identified in existing doctrinal literature. Figure 9 shows an extract from this staff training strategy.

STAFF TRAINING STRATEGIES

Establish individual technical proficiency of each staff officer. (Note 1) Examples:	Establish proficiency of the staff officer and his section. Examples:	Establish individual staff officer proficiency in interaction with other staff officers in staff groups. (Diads/Triads) Examples:	Establish proficiency of full staff. (Note 2) Examples:
S-1 (Treatment and Evac Plan); Personnel annex; etc. S-2 (IPB; MCOO; SITTEMP; Intel Annex; R&S Plan) S-3 (DST; maneuver plan; OPORD development) S-4 Admin/logistics annex FSO (FSEM; Fire Support annex) CESO (Communications plan) ENGR (MCOO)	S-2 section on IPB.	S-2 collaborates w/TF Engr to develop the MCOO FSO collaborates with S-2, S-3, and TF Engineer to develop the FSEM.	Production of products., e.g., OPORD. Execution of Processes. Where possible, orient on actual product produced (e.g., targeting process results in change to R&S plan, observer plan; orders process which results in developing an OPORD).

Figure 9. Extract from staff training strategies.

The overall process of selecting critical tasks for each type battalion and creating a hierarchy of tasks based on MTP task lists was complex and to a degree, dependent on the quality and maturity of the proponent MTP. The process followed by all SME/analysts was guided by these principles.

- Primary sources of "Fight" tasks are MTPs.
- Functional analysis was necessary to provide a structure for determining critical tasks by echelon and an appropriate hierarchy of major tasks and subtasks.
- The tasks at the staff echelon required a BOS functional analysis to determine critical tasks, and inter- and intra- BOS organization.
- The "Deploy/Redeploy" tasks are the result of working with CASCOM, the newly assigned proponent for deployment and redeployment. The tasks reflect what will be in the revised MTP.

- The "Sustainment" tasks are the result of analysis by the SME/analysts and observations of unit activities during this study.

Throughout the analysis process and subsequent development of the CATS critical task lists and the task hierarchy, the SME/analysts were involved in detailed discussions with a number of resources about the methodology and logic used for the study. Participants in this process included field units, the CATS POCs at each of the TRADOC proponent schools, current commanders, and a wide range of subject matter experts. In all cases, the SMEs, the field units (both in the United States and in Europe), and the proponent TRADOC schools concurred with the format and content of the tasks lists which form the basis for each type CATS. The methodology used to conduct the analysis was universally endorsed by each proponent.

Column Two: Frequency/Interval

After mission-critical tasks are determined, the remaining primary variable for a task based, resource predictive model becomes the frequency with which the task must be practiced in order to attain or retain proficiency. The ready to deploy in five days criteria clearly defined proficiency in an operational environment which did not allow post alert training. Realistic definition of how often (frequency) and in what period of time a unit/echelon/group/individual must train a task or set of tasks to ensure continuous proficiency was important. In addition, the SME/analysts understood that units are also required to accomplish non-training functions as part of their missions. Although training is the most important mission a unit may have, other missions demand commitment of the unit's collective time. From a CATS perspective, projections of time intervals must be as accurate as possible to enhance efficient allocation of resources, as well as scheduling and use of time.

The SME/analysts began with the basic assumption that at the completion of the CTC experience units are at their highest proficiency levels. It is also at this point that commanders have the most accurate assessment of unit strengths and weaknesses in performing mission essential tasks. A set of factors which lead to a decline in proficiency from CTC levels of performance were identified and considered to determine frequency and interval of training tasks. These factors are:

Turnover - the movement of personal into and out of the unit by reassignment either on order from higher headquarters or DA.

Turbulence - the movement of individuals from one duty position to another internal to the unit. Turbulence may be induced by turnover, promotion, discipline, proficiency or other internal needs of the unit.

Learning decay - the decline in proficiency resulting from the passage of time "forgetting curve"or basic teamwork rustiness.

Each SME/analyst studied his type unit and its unique situation during this phase of the study to determine impact of the forgoing. The conclusions to date indicate that turnover and turbulence most effect the frequency and interval data of every battalion strategy. In practice because of turnover and turbulence, collective tasks in many cases are not being retrained but are being trained for the first time by a new collective team. In this type of environment, turbulence and turnover drive training frequency and interval; learning decay becomes a moot point. Figure 10 presents data on turbulence in two divisions collected during the validation phase of this study.

TURBULENCE FACTORS

USAREUR Division

Majors: 12 months in position

Staff officers: Avg 6-8 months in position

Infantry Battalion

-Between 10-14 dismounts in each platoon

-75% turnover in BFV crews annually

Armor Battalion

-86% of tanks fully manned

-75% turnover in TC/gunner in last 6 months

FORSCOM Armor Division

Majors: 12 months in position

Staff officers: Avg 4.3 months in position

Infantry Battalion

-Between 9-11 dismounts in each platoon

-100% turnover in BFV crews annually

Armor Battalion

Approx. 70% of tanks fully manned

Data as of February 1995

Figure 10. Sample of data related to turbulence collected in validation phase.

The foregoing is reinforced and complemented by the Army's training system as defined by FM 25-100 which requires a cyclic (quarterly) system of assessments and short range plans to revise and refine the annual (long range) training plan at the battalion level.

The ODCSOPS proponent for the project clearly established cyclic training as a factor in study guidance at the beginning of the project. This was also concurred in by each proponent school and unit commander during phase one and revalidated during phase two. The parameters and the frequency/interval recommendations by the SME/analysts also were extensively discussed during the review boards. All the units felt the factors were effective and fit well with

the concept of time management used in their organizations and their higher headquarters. This data field was particularly apropos when the study group addressed the impact of "sustainment" tasks in the model.

Column Three: Means (Event) (Media)

After task and frequency, the means selected to train the task is the central element of the model. It influences all of the subsequent CATS entries. In the true context of a strategy, the means is exactly what it seems - *what is done* to accomplish the training goal. The study group worked extensively to develop this concept of means as a combination of event and media whose purpose is to achieve the strategic goal, improve or sustain proficiency.

The distinction between event and media is important and is key to making this model and the strategies sufficiently applicable and flexible for Army wide use. In addition, the distinction is necessary to integrate and understand the roles of current and developmental TADSS in Army training programs.

Events are scheduled training activities selected by commanders for practicing tasks. The list of events ranging from TEWTs to FTXs defined in FM 25-100 and FM 25-101 provides sufficient resolution for implementing CATS. The SME/analysts were certain that CATS would not require substantial modification of such events for the foreseeable future. These events are also the basis for much of the training programs (STX or task groupings) presented in current MTPs. By definition some events provide only part task training; therefore, selection of a particular event is a discrete election to only train parts of some tasks.

Media are generally best understood as TADSS in the most generic sense. Sandtables, chalkboards, and blank rounds are training aids; MILES and blank adapters are devices; UCOFT is a simulator; and JANUS or SIMNET are simulations. There are many more but the point is that a medium is intended to support events and some of them can support many variations of events.

Subsequent to their first meeting with the field commanders, all of the SME/analysts described encountering a relatively common misconception of equating training media with training events. As an example, some commanders and trainers talked about a JANUS or SIMNET exercise without specifying a corresponding training event in accordance with FM 25-100 or FM 25-101 (e.g., CPX or STX). This lack of connection to a recognized training event with consequent inherent structure/rigor caused some commanders to view JANUS or SIMNET as a kind of free-form tactical play, which though interesting, and sometimes beneficial, was hardly ever a serious training activity. In addition, this type of training often was not supported with appropriate personnel (OPFOR and OCs, for example) and training rigor (e.g., AARs).

The SME/analysts were careful to determine both an event and medium for each task in the CATS. The choice of means was also based on a determination of what aspect of the task required focus in the context of building or sustaining the required level of training. It was also

important to have a selection of event/media combinations to support a commander's requirement to make tradeoff among the contending imperatives of training value, time and cost.

The SME/analysts were careful to look for a balance so as to demonstrate that it is not necessary to choose the most expensive medium, which is usually field training, to train or sustain a training level. For example, "Command and Control" of the battalion usually can be trained in a CPX. The event title "CPX" generally describes who will participate and the rigor/scope of the event. The media for this event could be a major event list (MEL), JANUS, or BBS. The options of the commander are open because there are multiple event/media combinations to train the "Command and Control" task.

The completed CATS also demonstrate that selecting the best way to train a task is the key. For example, most aspects of the mission/task "Platoon in the Attack" can be better trained in a STX. Again, the event title "STX" generally denotes who will participate and some type of lane training. The media for the STX also can vary widely (i.e., MILES and OPFOR, live fire, PRIME, SIMNET, or a sandtable). However, the combinations are put together, the point is that a focused STX is the best way to train this task.

Several principles were used by each SME/analyst for determining the means for the individual battalion CATS based on personal experience and consultation with unit commanders in III Corps and V Corps. These principles should also be followed by unit commanders using CATS. They are:

- "Train Multi-Echelon Techniques" in accordance with FM 25-100.
- Use the most effective event to enhance the aspects of the task/subtask proficiency selected for improvement.
- Select the media based on training efficiencies afforded and the overall quality of the means desired.

These principles provide many advantages. First, available options for training live, virtual, and constructive simulations are identified. Second, the combination of proven training events, and old and new media enhancements (e.g., CPX- JANUS, CFX-SIMNET) are exploited. Third, there is the opportunity to identify and exploit developing or emerging TADSS (e.g., CCTT).

As the CATS study progressed, voids in media which would enhance training for a number of unit types were identified. These shortfalls provide insights as to requirements for TADSS such as the CCTT and WARSIM.

The discussions with the field and the proponent schools on available means to conduct staff training led the study group to further appreciate inherent requirements for media to train the staff tasks identified in CATS. Staff training exercises or STAFFEX require better definition. The term STAFFEX is much used in the field (and in some TRADOC schools) but it

is undefined in FM 25-101. This lack of definition appears to reinforce the impression in the field that there is a lack of a fully and defined and well understood staff training paradigm.

Column Four: Estimated Duration

This data element is simple but important to the model. It is here that the SME/analysts determined and recorded the estimated training time needed to improve or retain proficiency in a specific task. This was a judgement call; however, each proponent school and unit commander concurred with the final entry. The estimated duration shown in the templates refers specifically to the time required to train the fight or deploy task. It includes time to practice all three phases of a tactical mission (plan, prepare, and execute), as well as time for after-action reviews and limited re-execution as necessary. The duration times reflected for the sustainment tasks are SME/analysts' judgments of the time to complete the tasks.

Note that the time required by a unit to develop its own training support packages is not included in the duration of the event. This significant time requirement should have been accounted for in the sustainment category of the model. Because time required varies so much with the type of event and the media, it is virtually impossible to identify for these possibilities; therefore, this aspect, management of training, is not accounted for specifically in the prototype templates. The universal view of all SME/analysts is that the time requirement for the task is significant, but that event and media combinations derived from pre-existing TSPs will make local adaptations less time-consuming.

Column Five: Means Quality (A-D)

The concept of a quality rating for a means within a combined arms training strategy/ model is an innovative approach to a complex concept in multi-echelon unit training. Its purpose is to permit the Army to explain the requirement for disparate resource allocation for seemingly identical or repetitive training experiences at all levels within an organization. Rating levels A-D relate to the degree that a given "training means" satisfies the two major components of performance oriented training. The first component is the quality of the near combat environment (conditions) created for execution (mission/task); the second is the performance assessment and feedback process (standard). The quality of simulated combat conditions for a training audience in an event is measured in terms of the replication of accurate, effective cues and responses. The media or TADSS is one critical aspect of this but the total means must be considered (i.e., field site, OCs, OPFOR, etc.) to fully assess the conditions required to satisfy the first component.

The importance of assessment of the training audience's performance against a clear standard under selected conditions, and the quality of the feedback process to improve that task performance is accounted for in terms of the commander's confidence that the assessment is accurate and that the performance will translate to task performance in a combat situation. Mere completion of a training event should not mean that a commander can have complete confidence that his unit has improved. However, upon completion of a well conducted after action review

(AAR) based on accurate data collected by trained observer/controllers, the commander will know exactly what the unit can do. He will be able to make a sound judgement about the sub-tasks trained to standard that may be judged as transferable to combat readiness.

A developmental objective for CATS was to provide a descriptive, categorical rating for the quality of conditions and the assessment / feedback mechanism provided by a given training means. This permits answering that key question most often asked by resource managers, "Why can't you train the entire force with simulations or combinations of part task trainers--isn't it cheaper and equally effective?" The answer is that the commander must have the ability to assess his unit's combat readiness and determine the activity necessary to improve that performance. Other elements include individual and collective proficiency for all attached units and staffs and a view of their strengths and weaknesses. Each A - D rating is defined as follows to assist the proponent or ODCSOPS-TR to illustrate the variety of means quality required in a long range plan.

An "A" level means is identified as a CTC deployment and training activity, or other, similar deployment and training. The fidelity (realism) achieved by the terrain, simulations, simulators and opposing force provides a proper level of near-combat conditions that provides a unit with the opportunity to execute at the highest level short of combat. A commander should have great confidence in his assessment of his unit's proficiency based on that experience. At the CTCs, the Army assembles considerable resources not found at home station in order to conduct training under the most accurate near-combat conditions possible and to provide a highly accurate evaluation and feedback process. The commander's assessment is supported by CTC OC teams looking at every detail of operations.

A "B" level means is described as a high fidelity home station training exercise. It is a multi-echelon training experience with the participation of all elements of the unit needed to ensure accurate cues and responses. A "B" event will have well trained and sufficient OPFOR and appropriate OCs. The commander should have confidence in the accuracy of his unit performance assessment based on a B-level means.

A "C" level means is described as a partial task training exercise. It is deliberately limited by the trainer to focus on either a part of the task (performed by the full unit), or only a part of the unit (performing the full task). Typically, the resources for these means are limited to those available to the commander whose unit is being trained. This limits the availability of OPFOR and OCs, for example. The commander should be confident that learning that takes place in a C-level means will transfer to B-level means. However, the conditions replicated in the training are such that he may not be able to directly translate the assessment of the training performance to a USR type assessment, readiness under combat conditions, for his full unit executing the full task. "C" level means are an important part of the CATS: they provide individual and collective training necessary to attain the proficiency needed to participate safely and effectively in a "B" event, or to sustain a high level of proficiency obtained during a recent "A" or "B" event without expending a large amount of resources.

A "D" level means is described as a subtask training exercise. It is deliberately limited by the trainer to focus on a complete subtask (not linked to other subtasks), or a complete subunit (not linked to other subunits), or an individual. The complete appropriate audience for the task is present. Again, the resources will be limited to those the unit commander can provide. After this training, the commander should be confident that the individual or subunit can accomplish the task safely and effectively in a "C" or "B" exercise.

Column Six: Training Unit Audience

This data element is intended to provide as specifically as possible the soldiers and units required to participate in training activity once the task, means, and quality have been determined. Because this is a combined arms training model, it identifies all the appropriate battle staff and "slice" elements necessary for training the task. The purpose of this detailed data is to assist in the development of cost data for a given strategy or specific event. The SME/analysts provided this information in sufficient detail to determine the amount and type of equipment needed to permit the development of cost data. When used in conjunction with Column Three (Means) and Column Seven (Prerequisite Training/Gates), the training specificity is accomplished by providing a means, and identifying the skills that each subordinate or "slice" element must bring to the event. The training proficiency of the slice and supporting elements is an important element of the preparation for "A" and "B" events.

Column Seven: Prerequisite Training Gates

This column is critical to effective and safe implementation of training. Used properly, it insures efficient use of training time during scheduled events. It forces the training manager to specifically think through what he is going to train during an event and what skills the training audience must demonstrate prior to the event.

The SME/analysts developed the rules for establishing gate tasks and applied them to each task strategy. The basic principle is to define gates in terms of the training audience's readiness to progress to more difficult tasks or environments. The following are the constraints to progress through gates:

1. Training audience level of proficiency is so low that the unit will interfere with achievement of training proficiency by the rest of a larger training audience.

2. The training audience's level of proficiency is so low that the audience will be unable to profit by training the next task.

3. The training audience's level of proficiency is so low that there is significant risk of accidents in their participation in the next, presumably more difficult, task or training means.

The SME/analysts also developed several considerations to help in the description of the gate tasks when appropriate.

1. Identify the gates clearly enough to establish entry points for units just beginning use of CATS.

2. Staff training gates should be described in terms of the ability to produce products (e.g., OPORD, Fire Support Annex, DST) or certain tasks such as "battle tracking", which provide definition.

3. For collective unit training, gates should be described in terms of proficiency at MTP tasks.

4. For smaller echelons, gates based on safety should be described in terms of certification for individual or crew skills.

In the CATS model the SME\analysts probably erred on the side of over-prescribing gates. We recognize that this is a very sensitive commander's prerogative but from the perspective of providing a resource model it seemed best to err on the side of listing too much. Commanders using CATS can and should adjust gates for their training programs.

Column Eight: Remarks

This data element is a very flexible aspect of CATS. Components of the CATS that require integration with another task or clarification should be described in this column. The study group established the following minimum information in each CATS.

Purpose: Describe why the particular means or component was selected to train the task. Do so in relation to other tasks (next to be trained or what the deficiency is to be corrected). Be as specific as possible. If necessary, relate the tasks being trained to cues and responses of the means.

Outcome: Define goals for the training in terms of skills to be achieved.

Remarks: Any other information which will assist in understanding the strategy.

Phase One, Conclusion

The complete development of the data elements and the definition of each element was an iterative process which involved all 15 SME\analysts. The process took nearly five months and involved direct coordination with the TRADOC proponents, and III and V Corps unit commanders. At the conclusion of the effort the review board process began.

The review boards were hosted by ODCSOPS-TR and ARI. They were supported by BDM. The format was a detailed joint briefing by the type battalion commander and the SME\analyst. Each briefing was scheduled for three to four hours. The process involved a full week of briefings each in USAREUR and at Fort Hood. At each briefing each battalion commander was asked to comment on the adequacy of the model and the suitability of the strategy. Acceptance and approval of each model as an accurate reflection of each battalion's mission and environment were universal. The battalion commanders concurred that each specific strategy was either the "best way" or "a way" to train to achieve the readiness objective, "ready to deploy in five days". Several battalion commanders stated that they did not have sufficient resources to completely implement the strategy. (See chapter two of this report.) All agreed that they would implement their CATS to the best of their ability for the validation phase.

In June 1995 ODCSOPS-TR and ARI approved the continuation of the effort into Phase Two. The study at this point had completed the two major objectives of Phase One:

- First, develop and propose a combined arms training model for resource allocation as an alternative to the BLTM.

- Second, develop 11 type battalion combined arms training strategies for validation.

In addition, the implied and specified tasks of accomplishing coordination with and maintaining the support of the TRADOC proponents and III and V Corps unit commanders were successfully accomplished. The result was that as the project proceeded into Phase Two, the TRADOC proponents and the field commanders involved had confidence in the project and the product.

CHAPTER 2. PLAN FOR CATS VALIDATION

Development of Analysis Framework

The methodology for developing, validating, and revising CATS involved blending four perspectives: The subject matter expert (SME), the proponent school, USAREUR test bed unit(s), and FORSCOM test bed unit(s). The CATS for each battalion was developed by an SME who had personal experience leading battalion or brigade units of that type. The SMEs were well aware of the training requirements of their units. The proponent schools develop the warfighting doctrine for each of the battalion types, as well as the training doctrine and guidance that the units use at their home stations. USAREUR and FORSCOM represent two different training environments for similar type units. FORSCOM units typically plan their training programs to sustain readiness for 18 to 24 months between rotations to the National Training Center (NTC). USAREUR units typically plan training programs to sustain readiness for 12 months between their rotations to the Combat Maneuver Training Center (CMTC)[3]. USAREUR and FORSCOM units operate under different training constraints. FORSCOM units typically have larger training areas located on their installations and fewer restrictions concerning the days of the year during which they may conduct training events. USAREUR units must maintain their training readiness for warfighting missions, but are increasingly being asked to develop proficiency in Stability Operations, to include joint exercises with the Partnership for Peace (PfP) nations and training for -- and participation in -- peacekeeping operations.

In Phase I of this effort, CATS were developed by the SMEs and reviewed extensively by the proponent schools. Leaders of test bed battalions in FORSCOM and USAREUR were consulted as to the practicality of implementing hypothetical calendars of training events. During Phase II the test bed units attempted to implement the CATS to various degrees.[4] The SMEs who originated the training strategies monitored the test bed units' implementation and contrasted the training actually conducted with the prototype models. They made assessments of the feasibility and effectiveness of the prototypes, and revised the prototypes accordingly after consultation with the proponent schools.

In addition to having revised versions of CATS for the 11 battalion types, ODCSOPS-TR also wanted to know if CATS could be used as the basis for revising the BLTMs. In order to determine whether the CATS should be used for this purpose, five questions had to be addressed. The first of these concerns the degree to which the CATS are suitable for use by the battalion types for which they were developed. This question was broken down into four components.

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[3]Some units (notably MLRS battalions) rarely go to a CTC for training; instead, they conduct an external evaluation exercise (EXEVAL) at a different location. Combat service (CS) and combat service support (CSS) units usually send company-sized units to CTCs in support of maneuver battalions.

[4] Difficulties with CATS implementation are discussed later in this chapter.

1. Are the CATS suitable for use, based upon their completeness, organization, accuracy and adequacy?

Completeness: Do the tasks in the templates cover the unit's missions and does the training provide opportunities to practice integrating tasks across echelons and with other units?

a. Given the unit's assigned missions are there any essential tasks missing from the CATS templates?

b. Does each training strategy provide for integration of the tasks through appropriate echelons and across other CATS strategies?

Accuracy: Are the template events and media suitable for the tasks to be trained?

a. Is the training audience identified for each event appropriate and sufficient to attain the desired result?

b. Are the entry training gates for each element of the training audience appropriate for that element to accomplish and benefit from the training event?

Organization: Is the CATS template a useable sequence of training exercises?

Because the test bed units were not expected to alter their training plans and abruptly change to the CATS template, the following questions focused on assessing whether units could apply the strategies more systematically in the future:

a. Do commanders understand the CATS templates as they are now laid out?

b. Do commanders believe that, absent resource constraints, they could implement the sequence of training exercises in the templates?

c. Did commanders have a "better idea" that should be reflected in CATS?

Adequacy: Are the enabling resources/conditions specified for each event specific and complete enough to train the tasks and successfully accomplish the event? This includes time, personnel (the training audience is already accounted for above; here the focus was on needs for other personnel such as an opposing force, or OPFOR; or for Observer/Controllers -- OCs), and material (weapon systems, radios, night vision devices, ammo, Multiple Integrated Laser Engagement System [MILES] equipment, etc.).

One important component of the CATS is their use of current and projected TADSS as a medium for training. The second question in the analytic framework sought information about the current use of TADSS:

2. What was the frequency of use and perceived effectiveness of TADSS? Could TADSS be substituted for field training, as indicated in the templates? Did commanders identify other applications of TADSS that would be feasible and desirable?

The BLTMs made use of TADSS only at the level of crew training. CATS make more substantial use of TADSS, potentially reducing the requirement for OPTEMPO. This possibility led to the following question in the analytic framework:

3. How do CATS resource requirements compare to those of the BLTMs?

Keesling, Ford, O'Mara, McFann and Holz (1992) showed that turnover and turbulence of personnel had a substantial negative influence on unit performance. CATS are designed to repeat exercises often enough to diminish these negative effects. The following question was developed for the analytic framework to validate that CATS had the anticipated beneficial effect:

4. Are the intervals between planned repetitions of each task short enough to overcome the effects of personnel turnover and turbulence?

If CATS seem to overcome effects of personnel turnover and turbulence, then the next logical question is:

5. Would implementation of CATS permit units to sustain their training readiness within the band of excellence (defined in FM 25-100)?

The next section discusses the design of the data collection effort and addresses the quality of the information that was obtained about the implementation of CATS. This section examines difficulties with assessing the impact of CATS on unit training.

Data Collection and Analysis Plan

Several efforts were undertaken to answer the five questions posed above. The SMEs made repeated visits to the test bed units to discuss the templates with commanders, S3s and other trainers. During these visits the SMEs explored with the unit leaders what revisions were needed to make the strategies more complete and accurate. They determined whether the organization of the CATS was understandable and usable for its intended purposes, and they reviewed with these leaders whether the CATS seemed to specify adequate resources and realistically reflect training conditions. The SMEs also visited the proponent schools to review the content of the draft CATS templates. These efforts were the basis for the revision of the CATS templates and permitted us to provide answers to the sub-questions within Question 1.

The remainder of the data collection effort was focused on obtaining information about the training conducted by the test bed battalions to provide answers to the other four questions. Twenty-one US Army Active Component units (battalions or squadrons) representing eleven different unit types served as test beds for the implementation of the CATS. In general, there

was one unit of each type in USAREUR, and one in FORSCOM[5]. Test bed units were asked to facilitate a broad variety of data collection efforts[6]. Table 1 shows the correspondence between several data sources and the five research questions.

The data collection period began with the deployment of field data collectors to sites in USAREUR and FORSCOM in July, 1995. They were able to gather some data from June and prior months, depending upon the data archiving practices of the units. The two data collectors in USAREUR remained in place until mid-December of 1995, gathering as much November data as possible, and some from December. One of the two data collectors in FORSCOM remained in place through mid-February of 1996. The other was replaced by one of the returning USAREUR data collectors, who also stayed at the FORSCOM location through mid-February. In addition to gathering the unit reports, these on-site data collectors arranged interview schedules for the SMEs during their periodic visits. When invited, the on-site data collectors attended training meetings and talked with training managers so that they could alert the SMEs about events and circumstances of importance to the project.

The training event debriefs (TEDs) were designed to be used by the SMEs after training events that were nominally like those in the CATS templates. However, it became so burdensome on the units to schedule these interviews, and so difficult to schedule SME visits to the units to coincide with the (often changing) schedules of events, that the on-site data collectors were asked to distribute the TED forms to appropriate personnel in the units who filled them out. The SMEs attempted to review the TEDs with these personnel on their visits, but there were many TEDs that were simply distributed and collected as surveys, rather than being conducted as debriefs. The SMEs all felt, however, that they were able to interact with enough unit personnel in sufficient frequency and depth to provide the information they needed to revise the CATS.

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[5] USAREUR provided two test bed 155 SP field artillery battalions and two test bed mechanized infantry battalions. There was only one test bed assault helicopter battalion, in FORSCOM. There was one Avenger Air Defense Artillery (ADA) Battalion (USAREUR) and one Heavy-Stinger ADA battalion (FORSCOM).

[6] To ease the burden on the units they were only asked to provide access to existing records. No unit was obliged to collect data especially for this project.

Table 1. Application of data sources to research questions.

Question / Data Sources	1. Suitability of CATS Templates	2. Use of TADSS	3. Resource Requirements	4. Turnover and Turbulence	5. Sustainment within the Band of Excellence
Continuing Reviews of CATS Templates with Test Bed Units	✔	✔	✔	✔	✔
Continuing Reviews of CATS Templates with Proponent Schools	✔	✔	✔		✔
Training Event Debriefs	✔	✔	✔	✔	✔
TADSS Usage Data		✔			
Data on Turnover and Turbulence				✔	
Resource Requirements					
Unit Vehicle Mileage Reports			✔		
Unit Equipment Usage Reports			✔		
Unit Ammunition Usage Reports			✔		
Quarterly Training Briefings		✔	✔	✔	✔

At the end of the data collection period, the SMEs were asked to summarize their interactions with the unit personnel and the proponent school representatives, as well as their observations of the unit training, by writing responses to the five research questions. They also responded to a set of questions concerning training management practices in the units they observed. In addition, the SMEs prepared briefing materials for presentation to ARI and ODCSOPS-TR covering these issues. These are the primary sources for responding to the first of the questions posed earlier. Data from unit records and TEDs are used to address the other questions, amplified and qualified by the interpretations provided by the SMEs.

Limitations on Data Collection and Analysis

Generally speaking, the effect of a training program should be assessed using units that have had an opportunity to use the program over time, and have satisfactorily worked out the best way to implement it within their local circumstances. The test bed units had had no prior

experience with implementing CATS, so the evaluation could have been, at most, an examination of the extent to which units were able to implement CATS. An appropriate evaluation of the implementation of CATS would have required the units to have much more latitude than they had to schedule events and expend resources. The units were working within budgetary constraints, defined by the BLTM models CATS is meant to re-define, amplify, and justify, that prevented them from making adjustments to their training to reflect CATS requirements. Only one unit attempted to add an event to its training calendar as a result of considering the implications of the CATS templates, and that event was never performed due to lack of resources.

The test bed units were not required to implement the CATS templated training. In accordance with FM 25-100, they had already decided upon a training plan and calendar in advance of being nominated to participate in this project and they had little control over making changes to that calendar. Also all of the test bed units were subject to schedule changes directed from higher echelons, particularly the USAREUR units, which were tasked to participate in Partnership for Peace, stability operations training, and actual peacekeeping operations. Although there seemed to be a consensus opinion that there is considerable overlap between tasks performed in MIC missions and those performed in stability operations, the training time devoted to the latter was generally considered to detract from training on the MIC missions, which is the focus of the CATS templates. Some units implemented training programs that appeared CATS-like in focus and intensity, but these were both rare and coincidental, not intentional. Since the test bed units did not implement all aspects of CATS, it is only possible to speculate about whether implementing CATS would lead to the required level of training readiness.

Even if it had been the intention of each unit to attempt to implement CATS, and even if they had been allowed to do so, the brief period of time during which observation was conducted would have yielded only a modest amount of information. In fact, the low level of CATS implementation, combined with the short period of observation, limited data collection to only a few CATS-like events for most of the test bed battalions. In general, however, the amount of information gathered will provide a useful background on the conditions under which training took place in this period of time, but will not yield a satisfactory basis to estimate either the resources required by full implementation of CATS, or the effect that it would have on training readiness.

Half of the period of study was influenced by elevated levels of key personnel turnover (see response to Question 4). This may have disrupted both the acceptance of CATS and assessments of its utility. The acceptance of CATS was clearly disrupted by turnover at high levels of command in some units. The templates had to be re-briefed to new commanders or S3s, delaying or preventing acceptance by the unit. Disruptions of training actually caused by high rates of key leader turnover might have been mistakenly attributed to CATS implementation, resulting in lower assessments of the value of CATS.

The next sections discuss the general approach to addressing each question, given the above data sources and limitations.

Analysis for Question 1: Are CATS templates suitable for use? The SMEs summarized their experiences with the test bed units and proponent schools by answering questions about the completeness, accuracy, organization and adequacy (as defined earlier) of the CATS templates. Evidence from TEDs supplemented these reports, as appropriate. Specific caveats about the suitability of the templates were noted.

Analysis for Question 2: What was the frequency of use and perceived effectiveness of TADSS? Unit training calendars, QTBs, and unit reports about the use of TADSS were the primary source of information about use of TADSS. The interviews with commanders and proponents, and the TEDs contain information about the perceived effectiveness of TADSS. The SMEs provided a summaries of these perceptions.

One reason for having test bed units in FORSCOM and USAREUR was the difference in availability of TADSS. The FORSCOM units did not have ready access to SIMNET and they did not have the Platoon Gunnery Trainer (PGT). Units in USAREUR did have access to these facilities. Some types of units do not have collective training TADSS at present (FSB, engineer), and may not have them for some time in the future. There were relatively few examples of Battalion/Brigade Battle Simulation (BBS) or Corps Battle Simulation (CBS) being used as a driver for training exercises. The limited use of collective training TADSS (other than MILES) constrains generalizations from this study about the use of TADSS within CATS.

Analysis for Question 3: How do CATS resource requirements compare to those of the BLTMs? At the start of the study it was assumed that the units maintained records on the use of equipment and vehicles, and the consumption of ammunition. Special reporting forms were designed for on-site data collectors (not battalion personnel) to use to record these consumption data. Although most units do record usage, it is typically not attributed to specific training events, but recorded on a monthly aggregate basis. Although some units were able to provide a breakout by event (especially when there was only one event in a given reporting period), there were many other problems with this data. The SMEs also summarized their interactions with unit personnel concerning this question. Because of the importance of the question of resource requirements, all of the limitations of these data are presented in conjunction with the analyses for Question 3.

Analysis for Question 4: Are the intervals between repetitions of each task short enough to overcome the effects of personnel turnover and turbulence? Turnover and turbulence are important training distractors. Turnover is defined to be the number of personnel who depart the unit (and are replaced). Turbulence is defined as personnel changing positions within a unit. (Keesling, *et al*, 1992 examine these influences and provide references to other literature.)

Four sources of data on turnover and turbulence were considered. The first, SIDPERS (Standard Installation/Division Personnel System), was rejected on the grounds that it would

create a reporting burden on the units. The other three were: 90-day moving average of turnover taken from unit status reports (USRs), turnover in key battalion staff and leader positions during the six months of data collection (July to December, 1995), and battle rosters obtained from the test bed units on a monthly basis. The latter source did not prove useful: some units did not maintain battle rosters (or were unwilling to allow copies to be made), some provided updates on selected companies only, and some skipped several months of reports during the course of the study. The USRs and the reports focused on staff and leader turnover do not address turbulence, *per se*. Unfortunately, the uneven availability of battle rosters precluded developing a measure of turbulence.

Again, the SMEs summarized their experiences with the units by answering a question concerning the influence of turnover and turbulence on unit training and the degree to which CATS should overcome these problems. Information in the TEDs also contributed to this analysis.

Analysis for Question 5: Would implementation of CATS permit units to sustain their training readiness within the band of excellence (defined in FM 25-100)? The fifth question is the most difficult to answer. To evaluate the impact of CATS requires that a suitable measure of performance be obtained and that some of the test bed units implement the templated training strategies. The latter condition was not fully met, as explained above.

As to the measure of performance, FM 25-100, Training the Force, does not define the band of excellence in a way that permits rigorous, performance based, measurement or evaluation. The Department of the Army is circulating a draft version of a pamphlet on Operational Readiness (PAM 220-1) that does define a measure of performance based on the unit commander's assessment of the unit Mission Essential Task List (METL). This measure is discussed more fully in the section concerning Question 5.

CHAPTER 3. ANALYSIS

QUESTION 1: Are CATS Templates Suitable for Use?

Question 1a. Are CATS templates suitable for use as measured by their **completeness**?

Each SME consulted with both the proponent school and the commanders and staffs of the test bed units on this issue and, in virtually all cases, the tasks included in the revised matrices seemed to form the complete set needed to produce an effectively trained unit. The test bed units identified some tasks (especially for specialty platoons) that were subsequently included by the SMEs. Proponent schools contributed tasks derived from their ongoing revisions of doctrine, and seemed willing to consider tasks identified by the test bed units and the SME for inclusion in forthcoming Mission Training Plans (MTPs). Some specific concerns pertinant to two of the battalion types were:

1. The assault helicopter battalion template was completed for use by a battalion with the prescribed Table of Organization and Equipment (TO&E). However, the test bed battalion tended to train as a task force with attached cavalry, infantry and anti-armor elements. This configuration seemed atypical, so the CATS template was not altered. If assault helicopter battalions evolve into task forces configured with ground combat units, then the CATS templates will need to be revised.

2. The MTPs for the FSB and engineer battalions were under revision by the proponent schools during the evaluation period. Tasks from both sets of CATS templates were endorsed by the test bed units and were presented to the proponent schools for inclusion in the forthcoming MTPs. Many of the proposed tasks have been accepted for use in the MTPs, and a few are still being reviewed within the schools. The Army may wish to consider some of the steps in the CATS development methodology (described in an earlier section of this report) as adjuncts to the MTP development process.

The USAREUR test bed units raised an additional concern about completeness. They invested a large amount of time training for stability operations. During the time of the CATS validation (July-December 1995) the 7th Army Training Command produced a draft MTP covering these operations. The USAREUR test bed units were assigned missions of this type and included some related battle tasks on their METLs. USAREUR units expressed a desire for templates and calendars dealing with this set of missions.

Question 1b. Are CATS templates suitable for use as measured by their **accuracy**?

Accuracy was to be gauged by the degree to which the templated events and media are suitable for training the tasks. The choice of gates for entry to the event was also reviewed with the proponents and test bed units. Accuracy is more difficult to judge than completeness. This was especially so in this study because of the limited opportunities to observe units attempting to perform the events in the CATS templates. Some of the media choices (e.g., CCTT) are not yet

available to the units. While it was generally agreed that the media, events and training gates are accurate and that the CATS templates are, therefore, suitable for use, there were some specific concerns.

Many of the units are dependent upon other units to provide the training context in which they must operate. This may seem obvious for the FSB and engineer battalions, but the assault helicopter battalion and one FA battalion also raised this issue. In order to conduct events that are suited both to training the tasks and to making assessments of attained proficiency, these units have to have the cooperation and involvement of the unit(s) providing the appropriate context. The specifics of these concerns were:

1. The SME representing the assault helicopter battalion saw the quality of training of the battalion affected by the level of training of the supported and supporting units and felt that the gates for those other units needed greater emphasis in the CATS templates.

2. The CATS template for the engineer battalion specifies a brigade FTX to support the engineer task force FTX. The maneuver brigade must provide maneuver and combat support assets to the engineer task force to make this training realistic and effective. The SME for this battalion noted that there was no CATS template for a maneuver brigade and was not certain that the desired event would ever be conducted.

3. One of the field artillery battalions reported that it was only involved in Janus-based command post exercises (CPXs) with the units it would support at an upcoming rotation to the CTC. The CATS template specifies that an FTX should be performed. At the NTC, the Brigade staff had difficulties integrating artillery into their tactical plans, which would have been trained in the missing FTX.

The short time span of the evaluation raised an uncertainty for the attack helicopter units. They felt that they could not tell whether the number of FTX days, and their distribution throughout the calendar, was appropriate. Currently, the CATS template specifies four 5-day FTXs. The units were not sure that was enough, or whether it might not be better to use more days in each of a smaller number of events.

Using TADSS as a training medium raised some concerns. Currently there are no collective training TADSS for field artillery, helicopter, ADA, FSB, or engineer units. MLRS battalions have imbedded training capability on each launcher, so they can train the battalion mission in a 'closed loop digital environment' without an external TADSS. TADSS such as UCOFT and SIMNET serve only as partial trainers for the units having access to them. This reduces the flexibility available to the commanders and staffs as they plan and resource training events. To the extent that other combat arms units follow the lead of the MLRS by incorporating imbedded training capabilities in the weapon systems themselves, the MLRS CATS template (supplemented with a longer-term study of the use of these devices) could serve as a pilot test for developing appropriate training events. A subsequent section (Question 2) examines the use of TADSS in greater detail.

Question 1c. Are CATS templates suitable for use as measured by their **organization**?

Several of the trainers in the test bed units were too pre-occupied with their ongoing training concerns to attend to the detailed layout of the templates. Other trainers, and personnel in the proponent schools, had difficulty understanding the matrix layout. After a few examples were reported of SMEs having to point out that, for example, staff training is explicitly covered in the templates, it became clear that a table of contents for each battalion's book of templates would be useful. One of the field data collectors in USAREUR generated a prototype table of contents and this concept was rapidly approved and accepted as an improvement to the utility of the templates. Even with this improved 'user interface' many trainers reported that they would like to have the templates available in an automated training management system. One of the outcomes of this project was to input a preliminary version of the CATS templates, which has since become obsolete, into the Standard Army Training System (SATS), version 4.0. This conversion of CATS to SATS is discussed in more detail in Appendix D.

The SMEs' interactions with trainers and proponents also led to the development of a User's Guide that explains the layout of the templates in detail and shows how to employ them in planning training as described in FM 25-100. This guide (presented in Appendix A) should allow each battalion to use the book of templates without further assistance from an SME.

Another aspect of the templates that trainers liked was the sorting of applicable exercises by estimated means quality. This quality indicator was discussed in Chapter 1 (concerning CATS development) and is discussed from the battalion commander's perspective in the User's Guide (Appendix A).

The short time frame of the study led some battalions to be cautious about the degree to which they could implement the training contained in the templates. In some cases the templates were revised heavily during this period (e.g., doctrinal revisions impacted the attack helicopter templates), and the units and schools felt they could not pass judgement on the revised versions. Other units (especially in USAREUR) questioned whether they would ever have a period of time, even only six months, during which they could plan and execute a training plan without being required to radically alter the plan to support new missions/tasks imposed from higher echelons. Keesling, O'Mara and Flanigan (1994) documented the perceived debilitating effects of late and last-minute taskings on units.

Another effect of the short time frame for the study was that when some of the key training personnel turned over there was little time left to bring their replacements up to speed and receive their best judgement of the CATS templates. The SMEs felt, however, that where the trainers were able to review and understand mature CATS templates, they agreed that the sequence of training laid out in the templates and calendars was something they could do, if provided the opportunity.

Question 1d: Are CATS templates suitable for use as measured by their **adequacy**?

The focus of this question was on the enabling resources and conditions needed for each specific event. Generally speaking, no problems were identified with the requirements specified in the templates. The engineer SME noted, however, that the requirement for a maneuver brigade to support the FTX in the engineer battalion template might be very difficult to resource and conduct, especially in USAREUR.

The actual execution of training events, documented in the TEDs, brought to light unit problems in meeting the requirements of the templates. Several units commented that the training would have been better if the CATS requirements for participation by "slice" elements or supported units had been met. And, the TEDs revealed a few instances when the prerequisite training actually conducted was not adequate. Unit leaders stated that if it had been conducted as specified in the CATS templates, their units would have been prepared for the subsequent event.

Another difficulty for combat maneuver units was the fact that the unit being trained must usually supply its own OCs and OPFOR. While this may not be a problem for training lower echelons, it is a problem for battalion/task force events. Keesling, Ford and Harrison (1994) showed that an independently resourced OPFOR at home station was an important factor in determining unit performance at the NTC.

The test bed units also identified shortages of specific resources needed to perform adequate training. The attack helicopter and cavalry squadrons reported that the shortage of 2.75 rockets hindered their ability to achieve their training objectives. The attack helicopter units also indicated that lack of Hellfire missiles meant they could not do team firing training (Tables X, XI, and XII). The assault helicopter battalion reported a shortage of blank ammunition at both their home station FTX and at the JRTC rotation. The SME for the field artillery units pointed out that the OCs at NTC require the batteries to fire multiple volleys for a mission to be called effective. The STRAC allocation for home station training does not allow enough rounds to practice multiple volley fires. Both the assault helicopter battalion and the USAREUR armor battalion reported shortages of MILES sets. Reduced availability of simulations and simulators (discussed in more detail in the answer to Question 2, which concerns the use of TADSS) were reported by the ground maneuver units and helicopter units.

Discussion and Conclusions

In general, the trainers in the test bed units and the personnel in the proponent schools agreed that the training program laid out in the CATS templates would be suitable for use. The SMEs would have liked to have had additional time so that they could have observed all the CATS training events in each type of test bed battalion. Several of the leaders of test bed units stated that they would have appreciated the opportunity to perform the training program as laid out in the templates. One test bed battalion commander stated that CATS was his "roadmap to planning and execution of battalion training."

The concerns raised about the layout of the matrices and their use were addressed by developing a table of contents and a User's Guide. These additional items should greatly

enhance the utility of the CATS templates and calendars. The wider availability of CATS via SATS should also improve unit training management.

Shortages of specific training resources reported by the test bed units and SMEs would impact any training program. While improved training management systems may help to alleviate some of these problems, the availability of critical training resources must be assured, or the effectiveness of any new training program could be compromised.

QUESTION 2: What Was the Units' Use and Perception of Effectiveness of TADSS?

The focus in this study was on TADSS designed to provide collective training, yet reduce OPTEMPO requirements. The use of MILES was not examined in this project. Keesling, Ford and Harrison (1994) demonstrated that availability of MILES was critical for ground combat maneuver training. However, use of MILES entails OPTEMPO-intensive field exercises. Thus, TADSS such as UCOFT and SIMNET, and systems such as Janus and BBS that are used to drive training exercises, are the major focus of this study.

The SMEs who developed the CATS templates were aware of the currently available TADSS and those that are planned for deployment in the relatively near term. They incorporated these TADSS into the training matrices when they felt the TADSS would be available to units that would be using the templates in the future. For example, the armor battalion template encourages the use of CCTT for a battalion command field exercise (CFX). The validity of this suggestion rests on the effectiveness of CCTT for such training, and the availability of the system to armor battalions that implement CATS. There is little information about the effectiveness of some of these TADSS. The distribution of these systems to Army units is also uncertain.

Some TADSS arrived too late to be examined in this study. For example, Tank Weapons Gunnery Simulator System (TWGSS) arrived at the FORSCOM armor unit at the end of the study, and the Precision Range Integrated Maneuver Exercise (PRIME), which was made available at the same post at the beginning of the study, was not used by the test bed unit.

The next sections will present an overview of the use of TADSS and then examine the data gathered on those TADSS that were used most extensively. Table 2 shows the kinds of TADSS that the test bed units employed. The column headed Training Event Debrief indicates whether there was a specific training event conducted using this TADSS reported using the TED format. Such TEDs are rare, indicating that the TADSS were not often used by the test bed units as a means to conduct specific exercises. They were, instead, used to supplement field training by providing additional training in related tasks. This is especially noteworthy for SIMNET, which has the capability of simulating certain field exercises. The use of SIMNET to conduct specific events was mentioned only twice, and neither event was captured using the TED format.[7]

[7] The first, a battalion CFX, occurred prior to the start of data collection; while the second, in which one company did a fire coordination exercise (FCX), was conducted hastily when the Co Cdr was

The fact that a particular TADSS was mentioned does not mean that extensive data are available about that TADSS. The following discussion is divided into two parts: the first part concerns constructive simulations (Brigade/Battalion Battle Simulation; Corps Battle Simulation; and Janus); the second part concerns virtual simulations (Simulation Networking; Platoon Gunnery Trainer; and Unit Conduct of Fire Trainer).

Constructive Simulations. There was little evidence obtained about Brigade/Battalion Battle Simulation (BBS). Only the helicopter units reported using it, and one found it to be of limited value because it did not help to train company commanders or liaison officers in planning for assault or air mobile operations. The other test bed unit reported participation in a brigade/division exercise employing BBS, but no comment was made about its application to the battalion.

Table 2. Information available about TADSS, by type of battalion/squadron

Battalion/Squadron	TADSS mentioned in any report from field					Training Event Debrief	
Cavalry	SIMNET	UCOFT	PGT	CBS	Janus	CBS	Janus
Armor	SIMNET	UCOFT	PGT				
Mechanized Infantry	SIMNET	UCOFT	PGT	CBS	Janus	CBS	Janus
Field Artillery/MLRS					Janus		Janus
Air Defense Artillery		UCOFT			Janus		Janus
Attack Helicopter	BBS			CBS	Janus	CBS	Janus
Assault Helicopter	BBS						
FSB	None Applicable						
Engineer				CBS	Janus	CBS	

More information was available concerning training using the Corps Battle Simulation (CBS). One division-level CPX involving several of the FORSCOM test bed battalions was driven by CBS. The S3 of the cavalry squadron that participated in this event reported that it was superior to a battalion-level Janus CPX because it allowed the staff to practice working with liaison officers (LOs) to the division, and to coordinate with higher and adjacent units. The commander of the attack helicopter battalion that participated thought that the event was very successful in training staff elements in battlefield planning and execution.

A few problems were noted with this exercise. The S3 of the cavalry squadron noted that the space in the simulation center did not allow fully manned squadron command posts. The

informed at short notice that the facility was available.

engineer battalion staff had expected to participate in this exercise, but only the assistant brigade engineer section and the engineer brigade (staff) obtained training in this exercise.

A Warfighter Exercise (part of the Battle Command Training Program, BCTP) conducted using CBS involved the FORSCOM infantry battalion. The S3 considered this exercise to be very valuable training in synchronizing BOS and battle tracking. He did note that additional training of 'pucksters' (personnel who must convey messages from unit to unit, input data to the computers, and receive the computer outputs) would have enhanced the event.

Several events were conducted using Janus, and all of them were considered to be successful. The FORSCOM cavalry squadron conducted a three-day staff planning exercise focused on command and control. The XO considered it to be 80 to 90 percent successful at training these skills. He thought with more time and missions it would have been more successful. The SME thought it was a good match with the CATS staff-level template for command and control.

The FORSCOM attack helicopter battalion conducted a Janus CPX in the simulation center that the assistant S3 called very successful. The SME considered this event to be consonant with CATS.

The FORSCOM MLRS battalion conducted a three-day CPX stressing fire direction control, and command and control with the brigade. Although the CATS calls for a 12-hour event, this event was longer to accommodate a brigade CPX. The S3 reported that the battalion accomplished all tasks and goals for the CPX. He did feel that they needed to incorporate more administrative/logistics tasks and better integration of intelligence tasks.

Another Janus-driven CPX was conducted by the FORSCOM FA battalion. The overall impact of this exercise was not assessed, but it was noted that some key leaders, notably the XO, were not present. This was not a limitation of Janus, but a problem of schedule conflicts.

One USAREUR infantry unit conducted a CPX using a Janus-like simulation called UCATTS (Urban Combat Computer Assisted Training Simulation). Both the SME and the unit XO considered the event a success. It was consistent with the CATS, except for the omission of ADA elements, and included leaders down to platoon-level. The XO did feel that it would have been more realistic to set up the tactical operation center (TOC) in the field, rather than in the simulation center.

The FORSCOM ADA battalion conducted an STX using Janus. They set up their TOC in the training area to enhance realism. This was their first use of Janus in ADA-specific operations and the commander and staff were uniformly positive about the resulting training. The SME felt that the event was good match to the CATS template.

One staff exercise (STAFFEX) that could have been performed using Janus, but was not, illustrated the benefit of the Janus system. Very early in the data collection period, the

USAREUR cavalry squadron staff did not have the expertise required to organize a simulation-mediated staff training exercise. They used troop commanders to provide feedback to the staff, rather than the simulation. The XO for the unit acknowledged that some form of simulation-mediated event (as called for in the CATS template) would have allowed the staff to practice battle tracking and synchronization skills more effectively. It is noteworthy that the OCs at CMTC, in a rotation that occurred shortly after the STAFFEX, rated the staff as weak in these areas. This observation also indicates that training in the use of the available simulations would be valuable to the leaders and training managers.

Finally, the engineer battalion in USAREUR reported that a local adaptation of Janus might be useful in training combined arms breaching tasks and might substitute for some field training in mobility tasks. None of the reports from the unit indicated that they used Janus in this way during the course of the study.

Virtual Simulations. For all practical purposes, Simulation Networking (SIMNET) was only available to test bed units in USAREUR. None of the FORSCOM units used this system during the data collection period. Three SIMNET systems were used by the test bed units in USAREUR. One is located at Friedberg and has nine M1 stations and four M2 stations, which is not quite enough to allow a full armor combined arms company/team to maneuver. The second is located in Schweinfurt and has nine M2 stations and four M1 stations -- one station short of a full mechanized infantry company/team. The third SIMNET facility is located at Grafenwoehr and it has 29 M1 stations and 14 M2 stations, allowing a wide spectrum of simulations, up to, but not including, a full combined arms task force.

The armor test bed battalion was co-located with the armor SIMNET facility at Friedberg, and used the facility a total of 280 hours during Fiscal Year (FY) 1995. This test bed unit also used the facility at Grafenwoehr for 56 hours during this period. Neither of the test bed infantry battalions used the SIMNET facility at Schweinfurt, probably for two reasons:

1) they were each located at least two hours away, making it difficult to make substantial use of the facility during the day while returning the troops to their quarters at night;

2) this SIMNET facility was under the administrative control of a different division.

The unit designated MECH-1 is located within ½ hour of the facility at Friedberg and used it for a total of 88 hours during FY-95. The test bed cavalry squadron, also located within ½ hour of Friedberg, used this facility for a total of 90 hours in FY-95. MECH-1 did not use the facility at Grafenwoehr. The unit designated MECH-2, located 3-hours from Friedberg, used only the facility at Grafenwoehr. This pattern of usage suggests that commanders of test bed units did not seek to use SIMNET for the scenarios it can perform; rather, convenient location was a leading reason for use of the system.

The data collected for this project did not contain any positive remarks about SIMNET. One TED mentions a previously conducted, four-day SIMNET CFX and says it was not useful because it took too long to learn navigation within the system. Holz (1995) studied the CMTC

OPFOR's perceptions of USAREUR unit training, and reported that the OPFOR stated that maneuver units at CMTC move too quickly to detect OPFOR vehicles because SIMNET conditions them to move too rapidly.

The Platoon Gunnery Trainer (PGT) is only available in USAREUR. Four of the test bed units (1 cavalry squadron, 2 mechanized infantry battalions, and 1 armor battalion) used four PGT systems: one designed for M1s is located at Schweinfurt, one designed for M2s is located at Baumholder, and one of each type is located at Grafenwoehr. USAREUR requires the units to use PGT prior to doing Gunnery Table XII. The battalion designated MECH-2 and the cavalry squadron used these systems most extensively. MECH-2 used the systems for a total of 272.5 hours during Fiscal Year 1995, while the cavalry squadron used the systems for a total of 245 hours. The test bed battalion designated MECH-1 used the systems only 48 hours, none of which were at Grafenwoehr. The test bed armor battalion used these systems for 106 hours.

Usage at Grafenwoehr was very sparse, and coincided with each unit's gunnery cycles. Furthermore, this facility was down for software upgrades from January to March, and reports from the field indicated that after the upgrades this system was unstable and repeatedly down for maintenance, which decreased its availability. The cavalry unit used slightly more hours at Grafenwoehr for M2 training (72) than for M1 training (61).

Usage at the other two sites was entirely differentiated by the type of platoon -- the armor platoons used the Schweinfurt site and the mechanized infantry platoons used the Baumholder site. The armor battalion had only one session on the M1 system, using it for 48 hours. Other PGT opportunities for this battalion had to be cancelled for software upgrades. MECH-2 used the M2 system for a total of 240 hours, while MECH-1 used it for 48 hours. The cavalry squadron used the M2 system for a total of 72 hours and used the M1 system for a total of 40 hours.

Most of MECH-1 was out of country on another mission during December through June, with a recovery and reorganization period in July. Their low usage of the PGT system is accounted for by the small number of troops remaining in Germany and the process of restarting their training cycle once their other mission was concluded.

Taken together, <u>all</u> of the units in the 1st AD (not merely the test bed units) used the systems at Schweinfurt and Baumholder less than 25% of the time they could have been available (assuming 8 hours per day for 260 working days, yielding a total of 2080 hours available per year). They used the systems at Grafenwoehr even more sparingly (303 hours for M1s and 126 hours for M2s) -- but, other units may compete for time on these machines, and it is difficult to adjust for the effects of down time on these systems.

The only mentions of PGT in the TEDs were about the fact that some of this training had to be canceled. One of the TEDs indicated that it would have been valuable to have had the training.

Unlike PGT and SIMNET, Unit Conduct of Fire Trainer (UCOFT) simulators were available at all of the test bed armor, infantry and cavalry units. Different data were available from USAREUR and FORSCOM units, however. Originally, the data collection was oriented on the reticle aim level or matrix position attained by the crews in the UCOFT, but these data did not seem to be available in USAREUR. USAREUR was able to provide a report on the monthly hours of usage of the UCOFT systems, but only through Fiscal Year 1995[8]. Data on hours of usage were available in QTBs for some of the FORSCOM units. The FORSCOM QTBs also revealed some interesting information about the establishment of gates for the UCOFT.

Beginning with the USAREUR test bed units, Figure 11, which shows the hours of M1A1 UCOFT use by test bed battalions for FY-95, illustrates that usage varied widely by month. The armor battalion was in red cycle in May, then went to CMTC from June 9th to 29th, and were again in red cycle and recovery modes in July. In August and September they used UCOFT to prepare for their next gunnery cycle. The cavalry squadron was at Grafenwoehr doing gunnery in April and early May with a recovery period to mid-May, followed by a squadron CPX/STX to the end of May. Then they were at CMTC for most of June, followed by a recovery to mid-July. From mid-July on they picked up the pace in preparation for the next gunnery cycle.

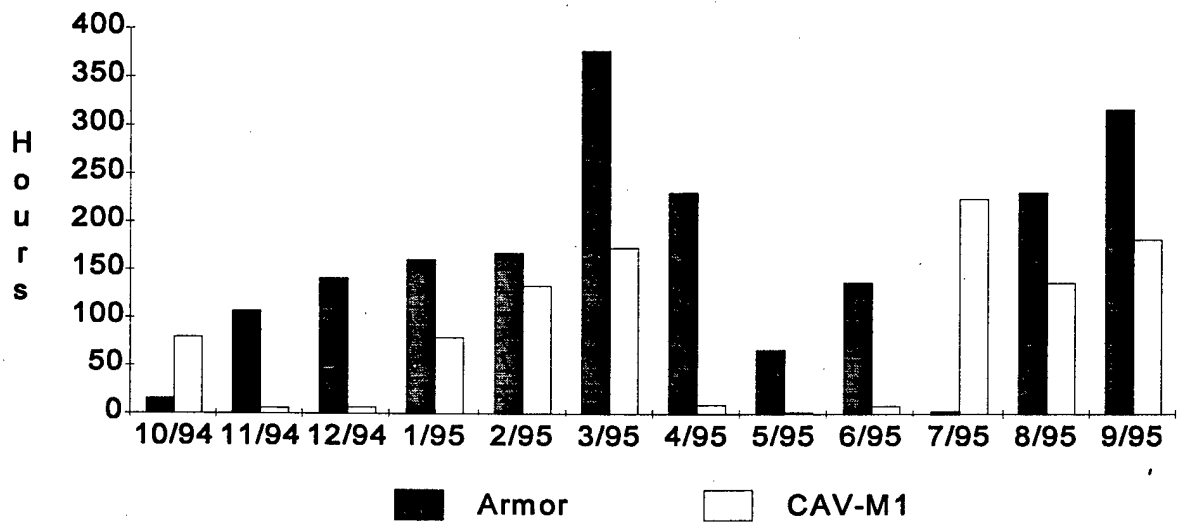

Figure 11. Fiscal Year 1995 M1A1 UCOFT usage by test bed units in USAREUR.

Figure 12 shows use of M2/M3 UCOFT devices by mechanized infantry and cavalry crews in test bed units in USAREUR. Most of MECH-1 was out of country from December to June, but the units that were left behind performed a Table VIII in the UCOFT in April. In June

[8] Data for the first quarter of 1996 would have been confounded with preparations for the Peacekeeping Operation in Bosnia, in any case.

and July, MECH-1 returned and reorganized. In August and September they began to use UCOFT in earnest to train their crews.

The pattern for MECH-2 is more complicated. They were performing gunnery during May. In June they were in green cycle for one week during which three days were spent in preparation and execution of a change of command ceremony. In July they were at CMTC, but returned with time for one week of green cycle at the end of the month. August was occupied with Expert Field Medical Badge (EFMB) and Expert Infantryman's Badge (EIB) training, leaving time for crews to practice in the UCOFT, while September had a home station gunnery during the first two weeks.

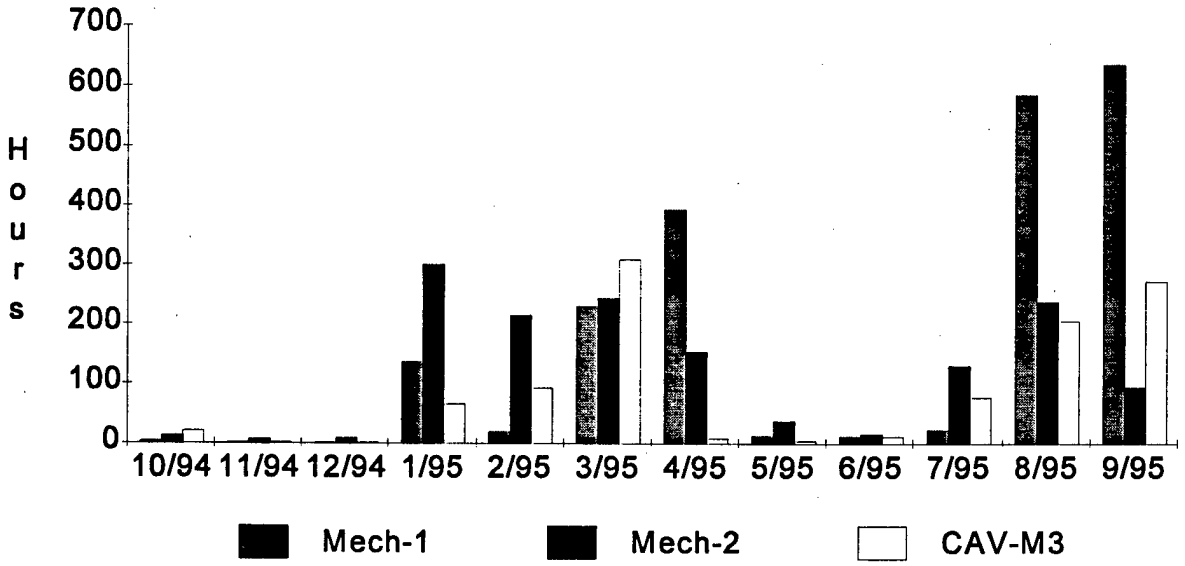

Figure 12. Fiscal Year 1995 M2/M3 UCOFT usage by test bed units in USAREUR.

These usage patterns indicate that when the units were at home station they made use of the UCOFT. The experience of MECH-1 suggests that UCOFT was viewed as a valuable aid to preparing crews in a freshly reorganized unit.

Interestingly, the QTBs from the USAREUR units rarely mentioned UCOFT. The armor and mechanized infantry battalion QTBs collected from the USAREUR test bed units during this study indicate past and projected days of use of Janus, SIMNET and PGT, but do not present any data for UCOFT. Furthermore, there is no mention of any standard, gate or requirement with regard to UCOFT (or any of the other simulations/simulators). By contrast, the QTBs from FORSCOM units present this type of information for UCOFT.

Some background information about the UCOFT will assist the reader to understand the data from FORSCOM units. Armor units using the M1A1 should use the UCOFT Advanced Matrix. This matrix has four series of training exercises. The first set (numbered 101-120) are designed to prepare the crew to fire a Tank Table VIII. A special set of 'gate' exercises (130-

145) are designed to replicate the Tank Table VIII exercises and are scored in the same way as Tank Table VIII. Once the crew has passed these gate exercises, they are re-initialized at the second regular series of exercises (201-214) and proceed to work through the second series, the third series (301-314) and the fourth series (401-412). The Armor School has established that passing the gate exercises (with a score of at least 700, just as for Table VIII) is a requirement for crews to be able to participate in live fire exercises. Hagman and Smith (1995) present a method for predicting Table VIII performance based on the Advanced Matrix gate exercises.

Crews using the M2 or M3 UCOFT progress through a complex series of exercises laid out as a three-dimensional matrix. The progression is not as 'lock-step' as in the armor Advanced Matrix: crews may bypass some of the exercises. The crew's Reticle Aim score indicates how far the crew has progressed. There is no set of Table VIII exercises for the M2/M3 UCOFT. The requirement for participation in live fire exercises is established at a Reticle Aim score of 21 or above.

The FORSCOM armor test bed unit discussed UCOFT in four successive QTBs, starting with 4th Quarter 1995. The 4th Quarter QTB presents a graphic that indicates that the gate for M1A1 is located just after exercise level 120 (i.e., they thought that the gate level was at the start of the gate). Of the 48 crews represented on this figure, only 13 were actually at exercise 201 or higher, indicating they had passed the true gate. However, this QTB states that 46 of 51 assigned crews are qualified (have passed Table VIII), indicating that the UCOFT requirement for live fire participation was not enforced.

The QTB for the first quarter of FY96 (prepared in September) correctly stated that the exercise level required for participation in live fire was 201, and only 25 of 58 crews met this standard. By December, when the QTB for the 2nd quarter of FY96 was prepared, only 22 crews were at this level.

These FY96 QTBs both stated a UCOFT strategy intended to have all crews firing at exercise level 201 prior to the January 1996 gunnery cycle: 1) Sixty days before the gunnery the crews were to be stabilized. 2) Forty-five days before the gunnery, all crews would be firing Group 1 exercises. 3) Thirty days before the gunnery all crews were to be firing the gate exercises. 4) By a specific date prior to the gunnery, all crews were to have passed the gate and be firing exercises in Group 2. The specific date shifted from 18 December (QTB for first quarter) to 10 January (QTB for second quarter).

In August, September, and October the battalion accumulated a total of 257 hours of UCOFT usage, or about 1.5 hours per crew, per month. In November the usage went up to 252 hours, followed by 323 hours in December. This usage parallelled the strategy in the QTBs. Unfortunately, the third quarter QTB did not discuss UCOFT performance, so the results of this effort are not known.

The FORSCOM mechanized infantry battalion also changed the level of UCOFT proficiency required for participation in live fire over the course of this study. In the QTB for the

first quarter of FY96 (prepared in August of 1995) the requirement was set at reticle aim level 14 (RA14), with a footnote that the battalion set a goal of each crew being at level 18. In the QTB for the second quarter (prepared in December), the requirement for participation in live fire was appropriately raised to RA21, but the accompanying chart continued to show the number of crews at or above RA14. The number of crews qualified at RA14 declined from 36 to 18 between the first and second quarter QTBs. By the end of November only two crews had attained the required level of RA21.

This battalion also showed a pattern of use directed by an overall strategy. Their strategy for the first quarter of FY96 stressed the integration of the UCOFT into weekly training schedules, in preparation for a gunnery in early 1996. Crews that were at the required reticle aim level (RA21) were to use the UCOFT for five hours a month, during normal duty time. Crews below that level were to use the UCOFT ten hours per month, which could be scheduled into weekends and/or off-duty hours. In November the battalion usage averaged 6 hours per crew. In December, the average usage increased to 12 hours per crew. By December 28th 44 of 58 crews were at RA21 or higher. However, the unit was unable to sustain these gains as the third quarter QTB showed that only 23 crews were at that level. This QTB did not present the hours of usage during the prior months (January and February of 1996).

QTBs from the FORSCOM cavalry squadron reported the monthly hours of usage versus the hours available, for both M1A1 and M2/M3 UCOFTs. These briefings reported on overlapping months and did not always give the same values. Some of these contradictions arose becaue the QTBs contained estimated values for the month in which they were prepared, but this does not explain all of the discrepant values. The following presentation makes use of the QTB closest to the month in question for which complete data should have been available at the time the QTB was prepared. Table 3 shows the hours of UCOFT usage during the months from June through January.

The M1A1 UCOFT usage declined as the unit prepared to switch to the M1A2. In November the M1A1s were turned in and M1A2s were issued. In December the crews began using the Advanced Gunnery Training System (AGTS) instead of the UCOFT.

M2/M3 UCOFT usage was relatively high as a percentage of time available, especially in September through November (how the unit was able to exceed the hours available was not determined). However, the QTB for the second quarter of FY96 (prepared on November 6th), indicated that 35 of the 37 assigned crews were below RA20.[9] It appears that average time in UCOFT of about four hours per crew per month (from June through October) was not sufficient to sustain a desirable level of performance. In December the crews doubled the rate of UCOFT

[9] This unit did not designate a reticle aim requirement for participation in live fire, and reported RA status in six groups. Groups 1 through 4 ran from RA1 through RA19.

use, and even though UCOFT usage declined radically in January and February[10], the squadron reported only 19 of 41 crews were below RA20 in the third quarter QTB (prepared in February).

CATS posits a steady-state use of five hours per crew, per month. The BLTM posited usage of four hours per crew, in each of 10 months. Even though CATS calls for an increase of 50 percent (from 40 to 60 hours per crew, per year), the data presented above indicate that this may not be sufficient. Even if the usage is restricted in some months, there may not be enough total time to provide for the surge requirements that appear to be necessary to reach the UCOFT gate levels of proficiency.

The FORSCOM ADA battalion also reported M2 UCOFT usage in the first quarter FY96 QTB. They stated that 16 of the 20 M2 crews had attained RA21, which they cited as a requirement to participate in live fire. They did not report hours of usage. The USAREUR ADA battalion did not have M2-type vehicles. Neither ADA unit reported time of usage or attainment in other weapon simulators.

Table 3. UCOFT usage by FORSCOM Cavalry Squadron.

	M1A1 Advanced Matrix Hours		M2/M3 UCOFT Hours	
	Available	Used	Available	Used
June	218	82	218	163
July	253	73	249	158
August	334	50	145	102
September	280	80	155	155
October	290	20	250	150
November	250	25	250	320*
December	--	--	280	75
January	--	--	280	70

* Reported usage hours exceeded reported hours of availability.
-- UCOFT not used: M1A2s replaced M1A1s, unit began using AGTS.

[10] Other units used the squadron's M3 UCOFT in these two months.

Flight Simulators

The assault helicopter battalion reported that it had no simulators on post. Crews from this battalion had to travel to a National Guard post about 200-250 miles away to use simulators.

The two attack helicopter battalions reported very different usage of their AH-64 simulators, as shown in Table 4.

Table 4. Total hours of AH-64 simulator usage, by month and location of test bed unit.

	USAREUR	FORSCOM
June	36	N/A
July	77	42
August	94	43
September	12	29
October	60	28
November	92	12

The USAREUR unit used considerably more hours of simulator time during this period, in part because it had all 24 crews authorized in the MTO&E while the FORSCOM unit had only 18. On the other hand, the FORSCOM unit reported that it used all of the simulator time it had available in each month. The USAREUR unit did not report available hours. Apparently the FORSCOM unit was not given the same access to simulators during this period. In the QTB for the third quarter of FY96, the FORSCOM unit indicated that their simulator had not been functional in the second quarter, so they had logged zero simulator hours in that quarter. The FORSCOM unit attempted to schedule time at an alternative training site, but was not able to use this facility because they did not have sufficient funds.

Discussion and Conclusions

Of the constructive simulations, CBS and Janus both had positive reports. CBS seems to provide opportunities for useful training at the battalion level. To the extent that battalions can coordinate with higher headquarters to be included in these exercises, they may prove to be valuable supplements to or substitutes for Janus exercises included in the CATS templates. Janus seems to be a very useful tool for driving staff exercises and CPXs. The single use of Janus for an STX observed during this study was considered successful.

The lessons learned about constructive simulations were:

1. Unit leaders and trainers may need to be given training or assistance with organizing simulation-mediated training so that they may benefit from this training medium at the earliest opportunity.

2. Training benefits are greatest when all of the specified training audience is present: scheduling conflicts must be resolved and the space available (in the simulation center, or elsewhere) must be large enough to accommodate all the players.

3. Training for personnel who act as message carriers may also be needed.

As for virtual simulations:

The test bed units did not have appropriate configurations of SIMNET hardware (i.e. suited to the company/team or task force composition) at the time of this study. Of the test bed units, the one that was co-located with a SIMNET facility that came close to the configuration needed for its company/team scenarios used the facility far more often than did the other units. Units located two or more hours away from the SIMNET facilities tended not to use them very much. This finding suggests that the Army will have to make a considerable investment in the projected follow-on simulator (CCTT) to make the system accessible and attractive to units if the CATS requirements for these sytstems are to be fulfilled. The problem that surfaced regarding learning navigation within SIMNET and the CMTC OPFOR remarks about possible negative training through SIMNET merit further investigation as to their applicability to CCTT.

It is important to note that the BLTM training model does not include platoon-level training, while the CATS templates include it as multi-echelon training in conjunction with company/team and battation/task force events. Thus, SIMNET and PGT provide device-based opportunities to incorporate training at the platoon level. The high usage of PGT (available only in USAREUR) by MECH-2 and the CAV squadron indicates that some commanders found PGT to be a valuable training device. The major problem with PGT seems to have been the down time due to software upgrades.

The flight simulator data also revealed maintenance problems that reduced usage of the system. If these simulators have proved valuable, then they should be maintained to provide a useful number of hours per crew of training time. The SME for the armor battalions reported that the UCOFTs for armor units were also experiencing maintenance-related problems.

The data collected in response to Question 4 show that if six months elapse between gunnery densities, nearly fifty percent of the personnel will turn over. The consequent turbulence will result in more than 50 percent of the crews requiring UCOFT time. The data presented above indicate that an average usage of four to five hours per crew per month is too little to attain the desired proficiency. At least a one month surge of up to 12 hours average usage per crew seems to be needed.

UCOFT usage at five hours per crew per month (as posited in the CATS matrices) would require 290 hours of UCOFT availability. A UCOFT for a single crew would have to be available nearly 10 hours per day every day of the month to meet this need. Surge requirements would be even higher. This heavy usage may account for some of the reported maintenance problems. CATS requirements will entail a commitment to deploy and maintain sufficient systems to assure availability when they are needed.

The test bed battalions appeared to regard the TADSS examined in this study to be effective. Access and maintainability were the most frequently cited problems. CATS templates rely heavily on TADSS, making it imperative that the Army comit to full deployment and maintenance of these systems if CATS templates are to be implemented.

QUESTION 3: How do Resource Requirements of CATS Compare to those of BLTM?

Where the BLTMs only considered crew-level virtual simulators, the CATS were designed to make optimal use of existing and future TADSS. This means, for example, that the armor battalion task force CATS substitutes some training in CCTT for field training. The frequency of certain field exercises in CATS is different from that in BLTM, and the lengths of some exercises are also different. Given the nature and extent of these differences, it is of interest to compare the CATS resource requirements to those of the BLTMs. At the direction of ODCSOPS-TR and ARI, a detailed comparison was performed, using the armor battalion as a prototype.

The starting point of this comparison is to show the training events that the armor battalion task force will conduct, under CATS, over a two-year calendar. Then, these events are contrasted to the events posited in the BLTM for this type of unit. Information about the CATS events is presented to show the amount of time spent in various training media (live, virtual and constructive simulations), and the requirements for leader time at various echelons. Finally, the BLTM and CATS OPTEMPO requirements are contrasted.

Armor battalion task force CATS events. Table 5 presents the 48 events that the armor battalion task force would conduct over two years under the CATS template. The events are laid out by echelon level and by the means quality indicator explained in the section of this report describing CATS development. Highlighted in this presentation are the 12 events conducted in CCTT. The CCTTs that are rated as 'B quality' are conducted by the echelon above the unit performing the exercise. This assures the availability of adequate OC teams and a thorough AAR. Thus, two CCTTs at Co/Tm level are rated B, because they are conducted by the battalion, while two others are rated C because each company/team conducts them without assistance from the higher echelon.

Over two years, the armor battalion task force will conduct two A-quality events: one CTC rotation and one CPX for leaders of CTC-bound units, which is conducted at the CTC.[11] The bulk of the events are of B or C quality. The B-quality events are field exercises and CCTT simulations that are run by the next higher echelon. The C-quality events are exercises that do not require extensive, if any, use of equipment in the field. The exception is that, as shown in more detail in a subsequent section, when the task force is required to portray the OPFOR to

[11] The CPX at the CTC is conducted as part of the Leadership Training Program (LTP). Although the approaches to LTP differ across the CTCs, the CPX at each is considered to be an A-level event.

another unit it will require considerable OPTEMPO. The four D-quality events are TEWTs at the Co/Tm level.

Table 5. Armor battalion task force CATS training events over two years.

Event, by Echelon	Armor Battalion Task Force Means Quality Rating				Total Events
	A	B	C	D	
TF					
FTX	1 (CTC)	3	1 (OPFOR)		5
CFX		4 (CCTT)			4
DEPEX			4		4
SEDRE/EDRE		2			2
LOGEX			2		2
Staff					
CPX	1 (CTC)	1	3*		5
STAFFEX		2	5		7
Co/Tm					
STX		3			3
CFX		2 (CCTT)	2 (CCTT)		4
CALFEX		2			2
TEWT				4	4
Platoon					
STX		4 (CCTT)			4
Gunnery		2			2
Total Events	2	25	17	4	48

* One CPX is part of a Division Warfighter Exercise

Another way to examine this set of exercises is to look at the distribution over types of simulation, by year, and by functional category within the training matrix. Table 6 arrays the CATS time requirements for the armor battalion by training medium (sets of rows headed: constructive simulation, virtual simulation, field training and live training), and by CATS functional category (columns titled: fight, deploy, or sustain). The CATS T-1 training strategy provides a mix of training media for the fight function:

Table 6. CATS Armor Battalion Task Force T-1 training strategy: Training days by functional category (fight, deploy, or sustain); and by medium (constructive, virtual, field, or live).

Armor Battalion / TF	CATS Training Days	Events/Yr		Days attributed to each CATS functional category					
				Fight		Deploy		Sustain	
Constructive Simulation Training	Days/Event	Yr 1	Yr 2	Year 1	Year 2	Year 1	Year 2	Year 1	Year 2
5a Division WFX (CBS/BBS)	10	1		10	0				
5b Brigade CPX (BBS)	5	1	1	5	5				
9 TF CPX (Janus)	2	0	1	0	2				
9a TF CPX (CTC)	3	0	1	0	3				
12 STAFFEX (Janus/BBS)	1	4	3	4	3				
16 LOGEX/LCX (BBS/Janus)	2	1	1	2	2				
24 Co/Tm STX + Plt STX (Janus)	1	1	1	1	1				
Total Days of Constructive Simulation Training				22	16				
Virtual Simulation Training									
5c TF CFX/FCX (+ Co/Tm + Plt) (CCTT)	5	2	2	10	10				
27 Co/Tm FCX + Plt CFX/FCX (CCTT)	3.5	2	2	7	7				
33 Plt STX (CCTT)	2.5	2	2	5	5				
Total Days of TF, Co/Tm and Plt Virtual Simulation Training				22	22				
40 UCOFT	0.625	12	12	7.5	7.5				
Field Training (Live Simulation Training)									
3 TF FTX (EXEVAL)	9	1	0	9	0				
2 TF FTX/MCX + Co/Tm EXEVALs	9	1	1	9	9				
4 CTC Rotation	21	0	1	0	21				
13 EDRE/SEDRE	3	1	1			3	3		
14a TF DEPEX	1	2	2			2	2		
17 OPFOR/OC	9	2	1	18	9				
34 Tank Gunnery Table I-VIII	10	2	2	20	20				
35 Tank Gunnery	3	1	1	3	3				
21 Co/Tm STX + Plt EXEVAL (field)	5	1	1	5	5				
22 Co/Tm STX + Plt STX (field)	5	1	0	5	0				
25 Co/Tm CALFEX	2.5	1	1	2.5	2.5				
30 Co/Tm TEWT + Plt TEWT	1	2	2	2	2				
Total Days of Field Training				73.5	71.5	5	5		
Other Live Training									
11 Staff Group/Staff Tng.	1	4	3	4	3				
18 Recovery	5	4	4					20	20
19 Motor Stables/Cmd Maintenance	0.5	36	36	18	18				
20 RC Support	14	1	1					14	14
36 TCGST	1	4	4	4	4				
39 Individual Weapons Qualification	1	2	2	2	2				
41 Sergeant's Time	0.625	40	40	25	25				
44 Semi-annual Services	10	2	2					20	20
45 Driver Training	1	4	4	4	4				
Other Time Requirements									
71 Training Management (QTB, Mtgs, OPD)	20	1	1					20	20
72 Soldier Support (Evals/Counsel/Boards;PT)	28	1	1					28	28
73 Perform Command Inspections	4	2	2					8	8
74 Personnel Processing	0.5	12	12					6	6
75 Post Support/Red Cycle	7	7	7					49	49
76 Holidays/Leave/Weekends/Family Time	155	1	1					155	155

- 16-22 days of constructive simulation,
- 22 days of virtual simulation for platoons or larger units, plus 7.5 days of UCOFT, and
- 72-74 days of field training.

The allocation of virtual simulation time is based on the proposed distribution of these facilities to III Corps. With 250 CCTT training days per year to allocate to 10 battalion-sized units, projected usage of 22 days by the armor battalion seems reasonable. To reach and sustain the T-1 level of proficiency, the armor battalion must spend about twice as many days in the field as are spent in simulations.

Deploy tasks are trained in five days of field training. The DEPEXs are designed to initiate the 9-day task force FTXs and CTC rotations. Sustain tasks are trained by live training (not conducted in the field). Training management time and non-training time (which will be examined in more detail in subsequent tables) are allocated to the sustain function. Additional deploy and sustain training is embedded in the training associated with the fight function.

Aligning CATS templates and calendars with BLTM events. The CATS templates and calendars present a task-based training strategy in great detail, offering considerable guidance about the desirable training audience, alternative training means, training gate prerequisites, etc. The BLTM models, as received for this project, consist of spreadsheets that estimate OPTEMPO requirements by linking various factors such as mileage per vehicle per day in a particular exercise type to the number of days in the exercise and the frequency with which exercises were repeated annually. These two approaches were so different that the first step in developing a comparison for armor battalions was to align the CATS templates with the BLTM.

Table 7 lists the CATS events (in bold face) with the BLTM events of a similar nature placed in adjacent rows. The vehicle densities, days per event, and number of events per year are based on the T-1 training strategy for CATS or BLTM, as appropriate. This table illustrates the fact that BLTM does not have training events at the platoon level.[12] Table 6 also shows that CATS is based on a two-year calendar with variations in the events performed each year, while BLTM is based on performing the same events each year.

[12] All of the BLTM spreadsheets received for this project had identical events; there was no differentiation by battalion type.

Table 7. Armor battalion training days for BLTM and CATS T-1 training strategies, aligned by training event types.

	Armor Battalion / TF	Number	BLTM		CATS			Battalion Training Days		
	Training Event	of Tanks	Days/Event	Event Freq.	Days/Event	Freq: Yr-1	Freq: Yr-2	BLTM	CATS-1	CATS-2
1	Bn FTX	58	5	3				15		
2	TF FTX /MCX + Co/Tm EXEVALs	58			9 –	1	1		9	9
3	TF FTX (EXEVAL)	58			9 –	1	0		9	0
4	CTC Rotation	0			21 =	0	1		0	21
5a	Division WFX (CBS/BBS)	0			10 ●	1	0		10	0
5b	Brigade CPX (BBS)	0			5 ●	1	1		5	5
5c	TF CFX/FCX (+ Co/Tm + Plt) (CCTT)	0			5 ●	2	2		10	10
6	Bn CFX	22	3	1				3		
7	Bn FCX	22	1	1				1		
8	Bn LFX/CALFEX	56	4	1				4		
9	TF CPX (Janus)	0			2 ●	0	1		0	2
9a	TF CPX (CTC)	0			3 ●	0	1		0	3
10	Bn CPX/MEX/TWT	0	3	3				9		
11	Staff Group/Staff Tng.	0			1 ●	4	3		4	3
12	STAFFEX	0			1 ●	4	3		4	3
13	EDRE/SEDRE	58			3	1	1		3	3
14a	TF DEPEX	58			1	2	2		2	2
14b	Bn DEPEX/ALERT	58	1	4				4		
15	Bn MCX	58	3	2				6		
16	LOGEX/LCX (BBS/Janus)	0			2 ●	1	1		2	2
17	OPFOR/OC	56			9 –	2	1		18	9
18	Recovery	58			5	4	4		20	20
19	Motor Stables/Cmd Maintenance	58			0.5	36	36		18	18
20	RC Support	42§			14 =●	1	1		14	14
21	Co/Tm STX + Plt EXEVAL (field)	58			5	1	1		5	5
22	Co/Tm STX + Plt STX (field)	58			5	1	0		5	0
23	Co FTX	56	3	3				9		
24	Co/Tm STX + Plt STX (Janus)	0			1	1	1		1	1
25	Co/Tm CALFEX	56			2.5	1	1		2.5	2.5
26	Co LFX/CALFEX	56	4	2				8		
27	Co/Tm FCX + Plt CFX/FCX (CCTT)	0			3.5	2	2		7	7
28	Co CFX	56	2	1				2		
29	Co FCX	56	1	1				1		
30	Co/Tm TEWT + Plt TEWT	0			1 ●	2	2		2	2
31	Co CPX/MEX/TWT	0	1	4				4		
32	Co MCX	56	3	1				3		
33	Plt STX (CCTT/SIMNET)	0			2.5 ●	2	2		5	5
34	TGT I-VIII	58			10 – ●	2	2		20	20
35	TGT XI-XII	56			3 ●	1	1		3	3
36	TCGST	13			1 ●	4	4		4	4
37	Crew Weapons Qualification	58	5	2				10		
38	Crew Weapons Sustainment	58	5	2				10		
39	Individual Weapons Qualification	0	1	1	1	2	2	1	2	2
40	UCOFT	0	0.5	10	0.625 ●	12	12	5	7.5	7.5
41	Sergeant's Time	0			0.625 ●	40	40		25	25
42	Common Military Training	0	2	7				14		
43	ITEP	0	1	21				21		
44	Semi-annual Services	58			10 ●	2	2		20	20
45	Driver Training	58			1 ●	4	4		4	4
46	Maintenance and Driver Training	58	1	60				60		
						Total Battalion Training Days:		190	241	232

Legend: – One weekend used for training. = Two weekends used for training. ≡ Three weedends used for training.
● Indicates an event that can overlap other training events. § National Guard pays for vehicle mileage during Annual Training.

CATS is clearly oriented to the combined-arms training required of today's Army, while BLTM is focused on the 'pure' battalion. For purposes of this comparison, the CATS data assume that companies that are cross-attached to other battalions are given equivalent training opportunities, so it is appropriate to account for resource consumption as a battalion. The Army's current accounting systems also work in this way: the costs of operating an item of equipment are charged to the originating, or parent, battalion.

Table 7 shows that CATS posits more training days each year than does BLTM. Table 8, in combination with Table 7, illustrates that the CATS calendar requires more days than there are in a year, while the BLTM calendar was created to fit within a 365 day year. The CATS values in Table 8 were obtained from FORSCOM input to the BLTM revision process, and confirmed by examination of the calendars obtained from the test bed armor units.

The CATS calendars and templates account for the apparent need for a longer year by allowing for events to overlap, or for events to take place partly on weekends. Weekends were 'fenced' in creating the BLTM models, so no event takes more than five days in that model. Special marks in the column for CATS days-per-event in Table 7 show which events can overlap with others and which will consume weekend days. For example, the TF EXEVAL (line 3) requires nine straight days, and takes up one weekend.

Table 8. Non-training events incorporated into BLTM and CATS.

Event	BLTM Days	CATS Days
Post Support/Red Cycle	24	49
Mission Support	6	0
Family Time	0	10
Leave	30	30
Holidays	11	11
Weekends	104	104
Total Days	175	204

The concept of 'battalion training days' (derived from the BLTMs, and presented in the last columns of Table 7) is difficult to understand. Platoons or company/teams performing certain events will only partially overlap, so the battalion will be engaged in these events for a longer time than the event will take any one platoon or company/team. For example, A Company may be the first to start performing a company/team STX, and before A Company finishes, B Company will start.

Table 9 presents a much more detailed analysis of the time requirements of the CATS training calendar, showing training days and various types of additional time requirements. It further breaks out the time required for each echelon of officers in the leadership team. The columns headed 'Days per Event by Participant' are weights that account for the degree to which events cannot overlap. For example, on line 22, the Co/Tm STX (with imbedded platoon STXs) will require five days for one company to complete. The battalion commander will be present for each Co/Tm STX, which partially overlap each other, so he is assigned a weight of 1.6, indicating that he will have to be present for eight days in the field.[13]

Table 9 shows that CATS implementation would require platoon leaders, company commanders, and the battalion commander to invest more days than are available in a calendar year. Solutions to this dilemma would be, as they are now, to work longer hours, to expand the responsibilities of subordinates, to conduct business on holidays and weekends, or to take fewer days of leave.[14]

Comparing CATS and BLTM OPTEMPO requirements. One objective of this trial implementation was to gather data on the OPTEMPO resources (e.g., vehicle mileage, hours of equipment use, ammunition expenditures) required to perform the events described in the CATS templates. Another contractor working for ODCSOPS-TR was to use this data to conduct revised analyses of BLTMs, using the CATS calendar of training events, and compute the dollar costs associated with conducting CATS-based training. The revised cost figures were to be used by ODCSOPS-TR to update the Training Resource Models (TRMs) that form the basis for the OPTEMPO requirements that the Army submits to Congress.

Two problems prevented the gathering and forwarding of the appropriate data: Opportunities to observe CATS events were limited; and credible data on resource consumption proved to be difficult to obtain. These two problems are discussed below, then a partial solution to the problem of comparing costs is illustrated.

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[13] The TF CPX at the CTC (line 9a) is weighted to show six days of training time and two days of travel. The CPX related training is approximately three days, as determined by the brigade commander.

[14] Funk, Johnson, Batzer, Gambell, Vandecaveye and Hiller (1980) report that commanders of battalions and company/battery-level units worked 65 hours per week, not counting work taken home, or time involved in field exercises.

Table 9. CATS Armor Battalion/Task Force T-1 training strategy time requirements, by year and by officer echelon.

Armor Battalion / TF	CATS Training Days	Events/Yr		Battalion Days		Days per Event by Participant				Training Days by Participant							
										CATS Year 1				CATS Year 2			
	Days/Event	Yr 1	Yr 2	Year 1	Year 2	Plt Ldr	Co Cdr	Bn Cdr	Bn Staff	PL	CoCdr	BnCdr	Staff	PL	CoCdr	BnCdr	Staff
2 TF FTX/MCX + Co/Tm EXEVALs	9	1	1	9	9	1	1	1	1	9	9	9	9	9	9	9	9
3 TF FTX (EXEVAL)	9	1	0	9	0	1	1	1	1	9	9	9	9	0	0	0	0
4 CTC Rotation	21	0	1	0	21	1	1	1	1	0	0	0	0	21	21	21	21
5a Division WFX (CBS/BBS)	10	1	0	10	0			1	1	0	0	10	10	0	0	0	0
5b Brigade CPX (BBS)	5	1	1	5	5		1	1	1	0	5	5	5	0	5	5	5
5c TF CFX/FCX (+ Co/Tm + Plt) (CCTT)	5	2	2	10	10	1	1	1	1	10	10	10	10	10	10	10	10
9 TF CPX (Janus)	2	0	1	0	2		1	1	1	0	0	0	0	0	2	2	2
9a TF CPX (CTC)	3	0	1	0	3		2.67	2.67	2.67	0	0	0	0	0	8	8	8
11 Staff Group/Staff Tng.	1	4	3	4	3				1	0	0	0	4	0	0	0	3
12 STAFFEX	1	4	3	4	3		1	1	1	0	4	4	4	0	3	3	3
13 EDRE/SEDRE	3	1	1	3	3	1	1	1	1	3	3	3	3	3	3	3	3
14a TF DEPEX	1	2	2	2	2	1	1	1	1	2	2	2	2	2	2	2	2
16 LOGEX/LCX (BBS/Janus)	2	1	1	2	2		1	1	1	0	2	2	2	0	2	2	2
17 OPFOR/OC	9	2	1	18	9	1	1	1	1	18	18	18	18	9	9	9	9
18 Recovery	5	4	4	20	20	1	1	1	1	20	20	20	20	20	20	20	20
19 Motor Stables/Cmd Maintenance	0.5	36	36	18	18	1	1	1	1	18	18	18	18	18	18	18	18
20 RC Support	14	1	1	14	14	1	1	1		14	14	14	0	14	14	14	0
21 Co/Tm STX + Plt EXEVAL (field)	5	1	1	5	5	1	1	1.6		5	5	8	0	5	5	8	0
22 Co/Tm STX + Plt STX (field)	5	1	0	5	0	1	1	1.6		5	5	8	0	0	0	0	0
24 Co/Tm STX + Plt STX (Janus)	1	1	1	1	1	1	1	4		1	1	4	0	1	1	4	0
25 Co/Tm CALFEX	2.5	1	1	2.5	2.5	1	1	4	4	2.5	2.5	10	10	2.5	2.5	10	10
27 Co/Tm FCX + Plt CFX/FCX (CCTT)	3.5	2	2	7	7	1	1	4		7	7	28	0	7	7	28	0
30 Co/Tm TEWT + Plt TEWT	1	2	2	2	2	1	1			2	2	0	0	2	2	0	0
33 Plt STX (CCTT/SIMNET)	2.5	2	2	5	5	1	3			5	15	0	0	5	15	0	0
34 TGT I-VIII	10	2	2	20	20	1	1	1		20	20	20	0	20	20	20	0
35 TGT XI-XII	3	1	1	3	3	1	1	1.6		3	3	4.8	0	3	3	4.8	0
36 TCGST	1	4	4	4	4	1	1	1		4	4	4	0	4	4	4	0
39 Individual Weapons Qualification	1	2	2	2	2	1	1	1	1	2	2	2	2	2	2	2	2
40 UCOFT	0.625	12	12	7.5	7.5	1	1	1		7.5	7.5	7.5	0	7.5	7.5	7.5	0
41 Sergeant's Time	0.625	40	40	25	25					0	0	0	0	0	0	0	0
44 Semi-annual Services	10	2	2	20	20	1	1			20	20	0	0	20	20	0	0
45 Driver Training	1	4	4	4	4					0	0	0	0	0	0	0	0
Total Days of Training Events:				241	232	By Participants:				187	208	220	126	185	215	214	127
Other Time Requirements	Days	Yr-1	Yr-2	Year 1	Year 2	Plt Ldr	Co Cdr	Bn Cdr	Bn Staff	PL	CoCdr	BnCdr	Staff	PL	CoCdr	BnCdr	Staff
71 Training Management (QTB, Mtgs, OPD)	20	1	1	20	20	0.7	1	1	0.15	14	20	20	3	14	20	20	3
72 Soldier Support (Evals/Counsel/Boards;PT)	28	1	1	28	28	1	1	1	1	28	28	28	28	28	28	28	28
73 Perform Command Inspections	4	2	2	8	8	1.25	1.25	1	0.5	10	10	8	4	10	10	8	4
74 Personnel Processing	0.5	12	12	6	6	1	0.5	0.5	0.5	6	3	3	3	6	3	3	3
75 Post Support/Red Cycle	7	7	7	49	49												
76 Holidays/Leave/Weekends/Family Time	155	1	1	155	155	1	1	1	1	155	155	155	155	155	155	155	155
	Total Days:			507	498	Participant Days:				400	424	434	319	398	431	428	320

Opportunities to observe CATS events were limited. The test bed units were not directed or mandated to implement CATS. Higher headquarters supported incorporation of the strategies to varying degrees. No additional resources were provided to the units to facilitate implementation. Each unit was at a different stage in its own long-range training plan, and the units varied in the degree to which they were able to, or wanted to, revise their plans to accommodate the strategies. Even if they had been attempting to implement CATS from the beginning, nearly all units were subjected to demands for support of, or participation in, unforseen events that disrupted their training plans.

The strategies are based on a two year training calendar. The test bed data collection spanned six months. While most of the test bed units performed some events that were similar to those described in the CATS templates, the limited time frame of the study reduced the opportunity to acquire data about all of the different types of events.

Even though an event might nominally be the same as one in the CATS template, the unit may not have conducted the event in the way envisioned by the SME (and approved by various reviews, including the unit's proponent school). In particular, battalion-level events in USAREUR often contained a stability operations component that would be inappropriate to include in the data concerning CATS-based training, which focuses on mid-intensity conflict. The SMEs who developed the CATS templates debriefed key leaders of the units after many of these training events to determine, among other things, whether each event was representative of the event type as described in the CATS templates. The goal was to use those events that were representative of CATS events as sources of resource consumption data.

Using the data base developed to convert the CATS templates to SATS (see Appendix D), a count of CATS event types was generated for each battalion type. Then, the number of event types for which there was a Training Event Debrief (TED) could be compared to the count of possible events. Table 10 summarizes these data. At best, 50 percent of the event types were covered by a TED.

It is important to note that there were very few missed opportunities to gather data on event types.[15] Even if every missed opportunity were recovered, the maximum coverage would still be 50 percent of the event types for any one battalion type.

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[15] Some events that duplicate others were missed (about 6). On the other hand, TEDs were obtained for replications of several event types, and some individual events were covered by TEDs from several personnel. Altogether, more than 200 TEDs were collected.

Table 10. CATS event types covered by data collection activities, by battalion type.

Unit Type	CATS event types using base item of equipment	Event types with one or more TEDs	Event types with TEDs and resource data	CATS event types that were conducted, for which TEDs were not obtained.
Cavalry	10	5	1	
Armor	10	5	3	
MECH Infantry	10	3	2	Gunnery
Field Artillery	12	5	2	Bn CFX, gunnery, platoon STX
MLRS	8	2	2	
ADA	7	3	0	
Attack Helicopter	10	3	0	DEPEX
Assault Helicopter	7	2	0	
FSB	6	1	0	Bn FTX
Engineer	9	4	1	

Table notes:

1. Only those events that involve use of the base item (sometimes called the pacing item) of equipment were included. Typically, the resource consumption data only differentiate events involving the base equipment item (e.g., tanks in an armor battalion), while the CATS templates include CPXs, TEWTs and simulator-based exercises (e.g. STXs in SIMNET), which do not involve that equipment.

2. NTC events for FORSCOM units were excluded. Typically, a FORSCOM unit does not use its own resources at NTC, so no data on resource consumption at NTC were obtained. During the time of the study, only the Engineer test bed unit participated in an NTC rotation.

3. CMTC events for USAREUR units were counted as the equivalent of a Bn FTX/EXEVAL, as they are in the CATS templates. USAREUR units do use their own equipment at CMTC, and data on the use of these resources were obtained, when they were reported.

Credible resource data proved to be difficult to obtain. Data collectors for this study were told to intrude as little as possible into the activities of the test bed units. They were not authorized to impose reporting formats, data collection procedures, or standards on the test bed units. Data collectors on site at the installations in USAREUR and FORSCOM collected the resource consumption data routinely (typically monthly) from standard Army record keeping systems.

Units do not typically record the resource expenditures on an event-by-event basis. The typical reports are monthly summaries of resources consumed (e.g., miles on vehicles, hours of use of simulators or other equipment, etc.). The standard reporting systems did not always refer to specific events, or used somewhat different nomenclature for the events. In some cases the event began and ended within the reporting period for the resource consumption data and the data seemed credible (e.g., the usage per vehicle was notably higher than in months for which no training events were scheduled). In other cases the data on resources were not interpretable because more than one event occurred during a reporting period and there appeared to be no way

to partition the reports to allocate the usage among events. In some cases an event spanned reporting periods for the resource data and it was not clear whether the data could be combined to create a credible data point. Reports were not available at all from some units. In a few cases the units volunteered to supplement these standard records with special reports to try to focus the data on the specific events, or to supply additional information (e.g., actual dollar costs for fuel, Class IX, etc.).

Some records contained resource data that seemed very unlikely. For example, one unit reported mileage on individual vehicles and some of them had negative mileage. A few units reported identically the same numbers for different events conducted in different months. Another battalion reported that one company required 70 percent more resources than another to perform the same set of exercises over a span of three months.

Table 10 also shows the number of event types for which there is a TED and what appear, upon cursory examination, to be credible data on resource consumption. At best, about 30 percent of the event types for a given type of battalion are covered by both types of data. Again, this percentage could shrink if the data were examined further: Battalion-level events conducted in USAREUR may incorporate stability operations, which would invalidate the resource data, for example.

An alternative approach to comparing BLTM and CATS OPTEMPO requirements for the armor battalion task force was developed and is presented in Table 11. The density of tanks required for an event, the days per event, and the frequency of the event each year, are given in the first set of six data columns. An intermediate computation, called Tank Usage Days, is shown for each of the two models in the next three columns. CATS has more tank usage days than BLTM in the first year, but fewer in the second year. The difference between the two CATS years is in lines 3 (TF FTX) and 22 (Co/Tm STX). Also note that there are no OPTEMPO costs to the Armor Bn/TF for RC Support (line 20), or CTC Rotation (line 4).[16]

To complete the OPTEMPO calculation, the tank usage days for each event were weighted by the mileage given in the BLTM spreadsheets provided to the project. The values in the column showing mileage for BLTM that ends (at the bottom of the page) with the computation of the total mileage and the OPTEMPO miles (miles per year per tank) agree with the values for a C-1 armor battalion in the original BLTM spreadsheet. The same mileage factor

[16] USAREUR units use their own vehicles at their CTC rotations, so the costs for these events must be accounted for separately for USAREUR units. In the summer of 1996 the Army decided to alter its policy and require that FORSCOM units pay for the operating and maintenance costs of the vehicles they use at the CTCs. These added costs will reduce the savings that are projected from the comparison of BLTM to CATS OPTEMPO requirements.

was applied to the corresponding CATS events[17] to produce the computations for the two CATS years.

In the first year, the CATS OPTEMPO is 11 percent higher than the BLTM OPTEMPO. In the second year, the CATS OPTEMPO is 27 percent lower. The difference is due to performing an additional TF FTX EXEVAL (line 3), an additional stint as OPFOR (line 17), and an additional Co/Tm STX with Platoon STX (line 22) during the first year. The integration of several TADSS-driven exercises into the first year (at lines 5, 9, 24, and 27) has only had a modest effect on lowering the OPTEMPO requirement. Over two years, the estimated CATS OPTEMPO is approximately 92 percent of the BLTM C-1 OPTEMPO.

Chapter 1 stated that the goal of the CATS development was to provide training strategies that would enable units to deploy in less than 14 days. The C-1 units are rated as deployable in 15 days, while C-0 units are deployable immediately. For an armor battalion the CATS OPTEMPO requirement is 24 percent lower than the BLTM C-0 requirement, averaged over two years. It is difficult to determine whether the fairer comparison is to a C-1 or C-0 unit; nevertheless, CATS OPTEMPO requirements do appear to represent a useful saving when compared to the BLTM.

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[17] Some CATS events are not obviously related to the BLTM events. The following explains the choice of factors used:

Line 13 (EDRE/SEDRE) used the BLTM value for DEPEX/ALERT.

Line 17 (OPFOR/OC) used 10 miles/tank/day, which is 70 percent of the BLTM value for Bn FTX.

Lines 18 and 19 (recovery, maintenance) used the BLTM value for maintenance and driver training.

Lines 21 and 22 (Co/Tm STX+Plt STX or EXEVAL) used the BLTM value for Co FTX.

Lines 34, 35 and 36 (TGTs and TCGST) used the average of the BLTM values for crew weapons qualification and crew weapons sustainment.

Lines 44 and 45 (semi-annual services and driver training) used the BLTM value for maintenance and driver training.

Table 11. Armor TF training days, tank usage days, mileage estimates and OPTEMPO for BLTM and CATS.

Armor Battalion/TF			BLTM		CATS			Tank Usage Days			Mileage		
	Training Event	# of Tanks	Days/Event	Event Freq.	Days/ Event	Freq. Yr-1	Freq. Yr-2	BLTM	CATS Yr-1	CATS Yr-2	BLTM	CATS Yr-1	CATS Yr-2
1	Bn FTX	58	5	3				870			12180		
2	TF FTX/MCX + Co/Tm EXEVALs	58			9	1	1		522	522		7308	7308
3	TF FTX (EXEVAL)	58			9	1	0		522	0		7308	0
4	CTC Rotation	0			21	0	1		0	0		0	0
5a	Division WFX (CBS/BBS)	0			10	1	0		0	0		0	0
5b	Brigade CPX (BBS)	0			5	1	1		0	0		0	0
5c	TF CFX/FCX (+ Co/Tm + Plt) (CCTT)	0			5	2	2		0	0		0	0
6	Bn CFX	22	3	1				66			1540		
7	Bn FCX	22	1	1				22			66		
8	Bn LFX/CALFEX	56	4	1				224			1344		
9	TF CPX (Janus)	0			2	0	1		0	0		0	0
9a	TF CPX (CTC)	0			3	0	1		0	0		0	0
10	Bn CPX/MEX/TWT	0	3	3				0			0		
11	Staff Group/Staff Tng.	0			1	4	3		0	0		0	0
12	STAFFEX (Janus/BBS)	0			1	4	3		0	0		0	0
13	EDRE/SEDRE	58			3	1	1		174	174		1740	1740
14a	TF DEPEX	58			1	2	2		116	116		1160	1160
14b	Bn DEPEX/ALERT	58	1	4				232			2320		
15	Bn MCX	58	3	2				348			2321		
16	LOGEX/LCX	0			2	1	1		0	0		0	0
17	OPFOR/OC	56			9	2	1		1008	504		10080	5040
18	Recovery	58			5	4	4		1160	1160		1160	1160
19	Motor Stables/Cmd Maintenance	58			0.5	36	36		1044	1044		1044	1044
20	RC Support	42			14	1	1		588	588		0	0
21	Co/Tm STX + Plt EXEVAL (field)	58			5	1	1		290	290		5510	5510
22	Co/Tm STX + Plt STX (field)	58			5	1	0		290	0		5510	0
23	Co FTX	56	3	3				504			9576		
24	Co/Tm STX + Plt STX (Janus)	0			1	1	1		0	0		0	0
25	Co/Tm CALFEX	56			2.5	1	1		140	140		840	840
26	Co LFX/CALFEX	56	4	2				448			2688		
27	Co/Tm FCX + Plt CFX/FCX (CCTT)	0			3.5	2	2		0	0		0	0
28	Co CFX	56	2	1				112			3192		
29	Co FCX	56	1	1				56			168		
30	Co/Tm TEWT + Plt TEWT	0			1	2	2		0	0		0	0
31	Co CPX/MEX/TWT	0	1	4									
32	Co MCX	56	3	1				168			560		
33	Plt STX (CCTT/SIMNET)	0			2.5	2	2		0	0		0	0
34	TGT I-VIII	58			10	2	2		1160	1160		8120	8120
35	TGT XI-XII	56			3	1	1		168	168		1176	1176
36	TCGST	13			1	4	4		52	52		364	364
37	Crew Weapons Qualification	58	5	2				580			4524		
38	Crew Weapons Sustainment	58	5	2				580			3596		
39	Individual Weapons Qualification	0	1	1	1	2	2	0	0	0	0	0	0
40	UCOFT	0	0.5	10	0.625	12	12	0	0	0	0	0	0
41	Sergeant's Time	0			0.625	40	40		0	0		0	0
42	Common Military Training	0	2	7				0					
43	ITEP	0	1	21				0					
44	Semi-annual Services	58			10	2	2		1160	1160		1160	1160
45	Driver Training	58			1	4	4		232	232		232	232
46	Maintenance and Driver Training	58	1	60				3480			3480		
					Tank Usage Days:			7690	8626	7310			
								Total Tank Miles:			47555	52712	34854
								OPTEMPO Miles:			820	909	601

Discussion and Conclusions

Better data on resource consumption are needed to complete the revision of the BLTMs to incorporate the CATS templates and calendars. A cost estimate for the armor battalion task force CATS was obtained by using the BLTM values for miles per tank per day of each exercise type. If the strategy were to be applied over two years, it appears that it might realize a saving of about eight percent of OPTEMPO cost when CATS is compared to a BLTM C-1 armor battalion. Additional savings would result, in time of war, from the CATS units being prepared to deploy more rapidly than BLTM C-1 units. However, this conclusion must be offset by the fact that the use of CCTT postulated in the CATS template for the armor battalion remains to be justified by data on the training effectiveness of CCTT, and requires that units have access to configurations of CCTT facilities that will permit company/team and task force training. The concerns raised about SIMNET in the answer to Question 2 reinforce these conclusions.

The large difference between the Year 1 and Year 2 OPTEMPO under the CATS calendar may create problems in managing the allocation of OPTEMPO dollars. It will not be acceptable to give the average value each year because there is no way to save the dollars from a year with a surplus to apply to one with a deficit. A new way of managing OPTEMPO dollars may be required.

QUESTION 4: Is the Planned Frequency of Repetition of Each Task Sufficient to Overcome the Effects of Personnel Turnover and Turbulence?

Question 4 and Question 5 concern the same general issue: does increasing the number of training opportunities improve unit performance? Keesling, Ford and Harrison (1994) showed that one measure of training opportunities, OPTEMPO, is related to unit performance. Keesling and Ford (1994), in a secondary analysis of the same data, showed that the stability of officers in the line companies combined with OPTEMPO to predict unit performance: the greater the turnover of officers, the more OPTEMPO would be required to attain the same level of proficiency. To sustain proficiency within the band of excellence (Question 5), a certain number of exercises must be performed, even if the personnel are stable. More training opportunities must be provided to sustain the same level of performance when personnel turnover rapidly (Question 4).

The answer to this compound question begins with an examination of the rates of turnover experienced by the test bed battalions, presented in this section. The answer to Question 5 presents a measure of proficiency and relates this measure to both the observed levels of turnover and the training opportunities provided to the testbed units. In this section two sources of turnover data will be presented in detail: 1) Ninety-day moving average turnover data from the USRs; 2) Key personnel turnover data collected from each unit.

USR 90-day moving average data. These data were not available from either MLRS unit, or from the USAREUR ADA or attack helicopter units. The data obtained from the FORSCOM assault helicopter battalion covered only July through October and are not included here. Table 12 presents the raw data for the test bed battalions. Figure 13 summarizes these data.

Table 12. Unit Status Report 90-day moving averages of percent turnover, by unit type and location for months from June through November.

LOCATION	UNIT TYPE	MONTH 06	07	08	09	10	11
FORSCOM	CAV	6	9	9	9	7	7
FORSCOM	ARMOR	8	8	8	7	8	7
FORSCOM	MECH	8	8	8	5	9	8
FORSCOM	FA	6	5	5	5	0	7
FORSCOM	ADA	15	15	15	12	11	15
FORSCOM	AH64	9	10	10	8	8	9
FORSCOM	FSB	9	9	9	8	9	8
FORSCOM	ENG	0	12	12	13	13	13
USAREUR	CAV	14	15	14	12	11	10
USAREUR	ARMOR	9	9	9	8	7	5
USAREUR	MECH1	7	6	6	6	6	6
USAREUR	MECH2	10	10	8	7	5	6
USAREUR	FA1	7	5	5	5	6	6
USAREUR	FA2	6	4	5	7	9	8
USAREUR	FSB	11	11	11	10	8	8
USAREUR	ENG	7	5	6	6	7	7

Overall, the FORSCOM units averaged nine percent turnover per month, while the USAREUR units averaged eight percent per month. This difference was not statistically significant in this sample. If the ADA and attack helicopter units, for which data were obtained only in FORSCOM, are eliminated, then FORSCOM and USAREUR turnover rates are both eight percent per month.

July and August had slightly higher rates of turnover than other months. This effect also was not statistically significant in this sample.

Generally speaking, the FORSCOM and USAREUR test bed units of the same type had similar levels of turnover; the notable exceptions being the cavalry squadrons and the engineer battalions. Unit types varied considerably in overall rate of turnover. The differences between unit types were statistically significant. The spread of average rates of turnover for six months of observation ran from 5.7 percent per month (FA) to 13.8 percent per month (ADA). Over six months the unit type with the least turnover had 34 percent, while the most extreme unit reported 82 percent turnover.

It is not clear why there should be persisting differences between unit types in the rates of turnover. If the rates of turnover are persistent and systemic they merit further examination as the differences between unit types could have profound effects on the requirements for sustainment training. Indeed, the FA units consistently reported themselves to be at higher training readiness levels than the ADA unit, as shown in the section of this report concerning Question 5.

	Average Rate of Turnover (Percent per Month)												
By Unit Type	03	04	05	06	07	08	09	10	11	12	13	14	15
FA			+	+00									
Mech. Inf.				0		+0							
Armor						+0							
Engineer				0				+					
AH-64							+						
FSB							+	0					
Cavalry						+					0		
ADA												+	
By Month													
June						x							
July							x						
August							x						
September						x							
October						x							
November						x							
By Location						0	+						

Legend: 0 = USAREUR, + = FORSCOM, x = Average over locations

Figure 13. Plot of Average Turnover Rates by Unit Type, Month and Location.

These rates of turnover are not substantially different from those reported in earlier studies. Funk (1983) states that the Army Training Study Group (ca 1978) determined that an 'ideal' rate of turnover would be about 6-7 percent per month, while they estimated that a 'realistic' level was on the order of 11-12 percent per month. Funk, *et al* (1980) report that turnover at the division level was about 6 percent per month. Turnover at the battalion level would have been higher, because some personnel would move from one battalion to another within a division. Keesling, Ford, O'Mara, McFann and Holz (1992) examined unit stability,

rather than turnover, in 1988-1990. Re-examining their figures indicates that battalion level turnover averaged about 7 percent per month, with a range from 4 percent per month to 12 percent per month. Thus, some units seem to experience turnover near the 'ideal' level identified by the Army Training Study Group, while others experience rates closer to the 'realistic' level. Funk, *et al* (1980) reported that one response to turnover was to train in cycles that permit periodic retraining of tasks at lower echelon levels. This approach is inherent in CATS.

Analyses performed on data collected from FORSCOM armor and mechanized infantry battalions between 1988 and 1990 (Keesling, *et al,* 1992) showed that personnel were more stabilized near the month of the CTC than they were in months well before or well after the CTC. It was not unusual for units to lose 10 percent of their officers in the two months following the CTC.

Examining the USR turnover data from this perspective, there were seven units that had a planned CTC during the period of data collection, all of them near the beginning of this period.[18] For each one, the 90-day moving average for the month prior to the rotation, can be compared to the 90-day moving average for the third month after the rotation. The former figure should show the effects of stabilizing personnel just prior to the rotation, while the latter should show the effects of releasing personnel who had been retained beyond their normal PCS dates. As a consequence of the timing of the CTC rotations, the first figure (about spring months) should also be low if personnel try to defer moving until summer, while the second figure should be high because it will span the summer months. Table 13 shows the data, which tend to disconfirm these speculations: only one of the seven comparisons (FORSCOM engineers) show the pre-CTC data to be lower than the post-CTC data.

The FORSCOM engineer battalion shows the largest effect in the expected direction, even though that unit had a high overall turnover rate (see Figure 13). For this battalion, all months except the month prior to their CTC rotation showed double-digit turnover rates. The zero recorded for the month prior to their CTC rotation means that they were able to retain all personnel for three straight months. It is tempting to speculate on the basis of this single case that FORSCOM units are more willing or more able to stabilize personnel prior to a CTC than are their USAREUR counterparts. Continued data collection might make it possible to determine if other FORSCOM units also stabilize personnel as effectively prior to their CTC rotations.

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[18] Near the end of the data collection period, several of the European units were sent through the CMTC as final training prior to deploying to Bosnia.

Table 13. Effects of CTC rotations on reported turnover rates.

Unit	Month of CTC	90-day Moving Average of Turnover, as Reported:	
		One Month Before CTC	3rd Month After CTC
CAV - USAREUR	June	14[a]	10
Armor - USAREUR	June	9[a]	8
MECH - USAREUR	June	7[a]	6
FA - USAREUR	June	8[a]	5
FSB - USAREUR	July	11[a]	10
Eng - USAREUR	July	7	7
Eng - FORSCOM	July	0	13

[a] These values are 60-day moving averages due to data collection problems in USAREUR.

Key Personnel Turnover Data. The data collectors were asked to fill in sheets indicating which key leaders turned over during the months of July through October[19]. Key leaders were defined to be personnel in positions equivalent to the battalion commander and staff (S1, S2, S3, S4, FSO, S3-Air, XO), company commanders, company XOs and company first sergeants. Data were not obtained on the FORSCOM ADA or MLRS units. The assault helicopter battalion reported they had no key personnel turnover during this period. Table 14 shows the average turnover per month for the six USAREUR units that had June or July CTC rotations, and for their counterparts in FORSCOM.

The data in Table 14 support the hypothesis that the turnover rate of key personnel is higher in the summer months than in the fall. In USAREUR, where the effect is larger, there may have been added emphasis on stabilizing personnel in the fall due to the impending deployment to Bosnia. The USAREUR turnover during the summer may also reflect the release of personnel stabilized for their CMTC rotations in June.

[19] The data collection form provided space to enter turnover through December, but most of the reports were filled out for the last time in October or November. Although they contained information about anticipated turnover in December, the data are probably valid only through October.

Table 14. Key Personnel Turnover, by unit type and month.

	Average Number of Key Personnel Turning Over per Month			
	USAREUR		FORSCOM	
Unit Type	July-September	October	July-September	October
Cavalry	1.33	1.00	1.67	0
Armor	2.67	0	1.33	1.00
MECH Infantry	1.00	0	1.67	2.00
Field Artillery	2.33	0	0.67	0
FSB	1.00	3.00	0	1.00
Engineer	2.67	1.00	2.00	0
Average	1.83	0.83	1.22	0.67

Data for five USAREUR units that did not have rotations in June or July are presented in Table 15. Three of these units had higher rates of turnover during the summer.

There is slight evidence in Tables 14 and 15 that key personnel are more likely to turn over during the summer than during the fall: 13 (68%) of 19 test bed units show this effect, but the six USAREUR unit types shown in Table 14 may be biased due to CMTC rotation effects or fall stabilization for duty in Bosnia. When these units are discounted, 8 of 13 remaining units (62%) show this effect. If only FORSCOM units with no CTC effects are examined, then 4 of 7 (57%) show the effect.

Table 15. Key Personnel Turnover for USAREUR units with CMTC rotations after June or July.

	Average Number of Key Personnel Turning Over	
Unit Type	July-September	October
MECH Infantry	0.33	2.00
FA (155mm)	2.33	0
MLRS	0.67	1.00
ADA	1.00	0
Attack Helicopter	1.00	0

Discussion and Conclusions

The test bed units were subjected to substantial turnover throughout the period of observation. Over the course of six months the average unit experienced turnover of half of its personnel. It is easy to imagine that a loss of 50 percent of trained crews and six to twelve key leaders would produce a substantial need to conduct training for their replacements. Turnover of the staff and staff trainers (e.g., battalion XO) exacerbated the lack of training support for battalion/squadron staff reported by the SMEs.

It is not clear how to adjust CATS for these turnover rates. The study period was too short to determine whether they will persist, or whether they vary by season, or in relation to CTC rotations. When all personnel were considered together there was slight evidence of elevated rates of turnover during the summer months. Key personnel seemed to be more likely to turn over during the summer than during other months. These effects did not seem to be related to CTC rotations in this sample. CATS templates are believed to incorporate sufficient repetition of training to allow for approximately the average turnover observed among these units. Individual battalions were observed to have highly variable rates of turnover from month-to-month, however, so there may be times when even the CATS templates do not provide enough task repetition to sustain high levels of performance.

The response to Question 5 examines the proficiency levels of the units and relates them to the turnover rates discussed above. The discussion section of the response to Question 5 presents conclusions concerning the frequency of CATS events and the proficiency levels attained by the test bed units.

QUESTION 5: Would Implementation of CATS Permit Units to Sustain Their Training Readiness Within the Band of Excellence?

The intent of CATS developers was to provide strategies that could enable units resourced at the T-1 level to sustain their training readiness levels within the band of excellence defined in FM 25-100. Question 5 is a direct inquiry about the success of this endeavor. The answer requires three steps:

1. The concept of the band of excellence is operationalized with respect to proficiency ratings derived from QTBs. These ratings are also translated into T-levels, so that the general readiness level of units can be examined, and to compare levels attained prior to and after CATS implementation.

2. The effect of training activities on proficiency ratings is examined and related to the unit's training plans and calendars.

3. Since CATS should overcome the efects of turnover and turbulence, the combined effects on proficiency ratings of overall turnover, leader turnover, and CATS-like training exercises are assessed.

Operationalizing the band of excellence and determining T-levels of test bed units

The Department of the Army (DA) has prepared a draft of a new document, Operational Readiness (PAM 220-1, 1995), that provides guidance on the computation of several 'Training Readiness Standards.' One of the standards, 'Percent METL Trained,' appears to provide a working definition for the concept of the band of excellence described in FM 25-100. The commander computes his percent METL trained by following several steps:

1) Develop, and gain higher commander's approval of, unit METL.

2) Assess proficiency resulting in a rating of each METL item as T, P, or U (defined on pages 3-13 of FM 25-101). "This METL assessment should be in consonance with the assessment presented during the unit's Quarterly Training Brief (QTB)." (Draft PAM 220-1, paragraph 6-6.e.)

3) Perform a computation in which the T, P, and U ratings are weighted 3, 2 and 1, respectively, and the weighted values are summed to form a numerator. The denominator is three times the number of items in the METL. The ratio of numerator to denominator, multiplied by 100, is the Percent METL Trained.

4) To be T-1, a unit must score 85 or higher on the percent METL trained scale. Units scoring 70 to 84 are T-2. Units scoring 55 to 69 are T-3. Units scoring below 55 are T4.[20]

The interpretation employed in this study is that the 'band of excellence' for a T-1 unit lies between 85 and 100 on the Percent METL Trained scale. The next paragraphs discuss some of the implications of using this scale, then examine the scores obtained by the test bed units.

Nine test bed units from FORSCOM and ten from USAREUR provided one or more quarterly training briefs with ratings of METL proficiency.[21] The number of items in each unit's METL ranged from four to twelve. Table 16 provides the minimum number of items that must be rated T (with the remainder rated P) to attain a T-1 rating on Percent METL Trained, over the range of four to twelve METL items.

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[20] The definitions of T-levels in Appendix D of Draft PAM 220-1 are slightly different from those in the text of the PAM, which are used here.

[21] The USAREUR attack helicopter battalion did not produce QTBs during the time of data collection. No QTBs were obtained from the assault helicopter battalion.

Table 16. Computation of Percent METL Trained.

Number of METL items	Minimum Number of Ts	Remaining Ps	Percent Rated T	Percent METL Trained
4	3	1	75%	92%
5	3	2	60%	87%
6	4	2	67%	89%
7	4	3	57%	86%
8	5	3	63%	88%
9	5	4	56%	85%
10	6	4	60%	87%
11	6	5	55%	85%
12	7	5	58%	86%

If the commander of a unit rates all METL items P, regardless of the number of items, the unit will have a score of 67 Percent METL Trained, and will be rated T-3. If a unit has an even number of METL items, and if the commander rates ½ of them T and the other ½ P, then the unit will have a score of 83 Percent METL Trained, and be rated T-2. A unit rating itself 'U' on all METL items would have a score of 33 Percent METL Trained: that is, the bottom end of the scale is 33, not zero. Table 16 shows that, for typical numbers of METL items, a unit will be T-1 if it only has Ts and Ps, and the number of Ts is larger than the number of Ps .

Although the percent of METL items rated T declines from 75 percent of four items to 55 percent of eleven items, the Percent METL Trained derived by the formula score prescribed in Draft PAM 220-1 never dips below 85 percent. This gives an apparent advantage to having a longer METL.

In many cases the QTB for one quarter contained a synopsis of the QTB for the prior quarter, including the METL ratings for that prior period. These ratings were used to augment the data with ratings for quarters prior to the onset of data collection for this project. Table 17 displays the Percent METL Trained scores derived from the QTBs.

Data collection in USAREUR ended before all of the test bed units had published QTBs for the quarter beginning January 1996 (FY96, Q2). The first QTB obtained for most FORSCOM test bed units was for the first quarter of Fiscal Year 1996 (FY96, Q1). Thus,

USAREUR units have more information about the period prior to CATS implementation, and less about the period after CATS was initiated, while the opposite is true for FORSCOM units.

It is arguable that some of the units should not have participated in a study aimed at examining T-1 units. The USAREUR unit labeled MECH1 and the FORSCOM ADA unit had both recently returned from peacekeeping operations far from their home stations and were in the process of reforming and reorganizing when they were approached to participate in this project. Both initially reported Percent METL Trained scores indicating that they were at T-4, and both improved to T-3 during the course of the study. A third unit, the FORSCOM FSB battalion reported that it had done no significant training since its prior NTC rotation (about six months prior to the start of data collection), and did not do any CATS-like events during the first half of the data collection period. This unit reported Percent METL Trained scores at the T-3 level.

Table 17. Percent METL Trained scores for test bed battalions.

	Percent METL Trained Reported at the Beginning of Each Quarter				
UNIT	95Q3 (March)	95Q4 (June)	96Q1 (Sept.)	96Q2 (Dec.)	96Q3 (March)
USAREUR					
CAV		96	88	88	
ARM	69	83			
MECH1	50	60	67		
MECH2	73	70			
FA1	76	81	81		
FA2		71	81		
MLRS	73	73			
ADA	67	87			
FSB	88	100	83		
ENG	81	78	78		
FORSCOM					
CAV		92	67	67	67
ARM	71	67	70	92	79
MECH		67	67	81	67
FA		83	79		
MLRS				100	
ADA		42	67		
AH64[a]		89	78	72	89
FSB		67	67		
ENG	67	95	67	67	67

[a] AH-64 designates the attack helicopter battalion.

All of the remaining 16 test bed units reported Percent METL Trained scores at the T-2 level at least once, and eight of them reported scores at the T-1 level at least one time. Table 18 shows the distribution of the T-level equivalence from the two sets of units. Strikingly, 41 percent of the scores were in categories T-3 and T-4, 38 percent were in category T-2 and only 21 percent were in category T-1. USAREUR units had a higher proportion of ratings at the two highest T-levels than did FORSCOM units.

Table 18. Distribution of T-levels based on Percent METL Trained, by unit location.

T-Level corresponding to Percent METL Trained Score	Number of QTB reports	
	FORSCOM	USAREUR
T-1	6	5
T-2	8	14
T-3	14	4
T-4	1	1

The most direct assessment of the impact of CATS implementation would be to compare the T-levels for the test bed units prior to and after their implementation of CATS. Other sections of this report have indicated that few of the units actually implemented CATS (although most endorsed it as a valid training program -- one they wished they could perform). For most units, the data collection period was very limited, so only results of the first quarter of CATS implementation can be contrasted to pre-CATS proficiency. Of course, changes in unit mission (e.g., peacekeeping operations added to USAREUR unit missions and training) and turnover of unit personnel (reported in answer to Question 4) make such a comparison ambiguous.

Nevertheless, if the T-levels derived from the June QTBs (FY95, Q4) are compared to those from the September QTBs (FY96,Q1), Table 19 shows that of five units starting at T-1, four declined to T-2 or T-3. The four units initially at T-2, remained at T-2. One of three units at T-3 gained to T-2; and the two units at T-4 gained to T-3. Because of the factors sited above, it is not appropriate to attribute the slight overall decline to attempts to implement CATS. An alternative explanation, that the decline is from levels attained prior to and during CTC rotations and EXEVALs, is examined next.

Table 19. Changes in T-level through the first quarter of CATS implementation.

Initial T-level	T-Level at end of first quarter of CATS implementation (September)			
(June)	T-1	T-2	T-3	T-4
T-1	1	2	2	
T-2		4		
T-3		1	2	
T-4			2	

The effect of training activities on performance ratings

Keesling, *et al* (1992) verified that units tend to train more intensively as the time for a major exercise, such as a CTC rotation, approaches. CATS, on the other hand, tries to spread training out so that the unit sustains its level of readiness throughout the period between major exercises. When the data in Table 17 are re-arranged (as in Table 20) to be aligned with the major training exercises (defined for this purpose as CTC rotations and EXEVALs, in which a unit is assessed by outsiders), the pattern of 'ramping up' to the major exercise and declining afterwards is revealed. Figure 14, which is based on the data in Table 20, shows this phenomenon clearly.

Table 20. Percent METL Trained scores aligned to EXEVALs (including CTCs).

	Percent METL Trained Reported by Quarter Relative to EXEVAL				
UNIT	EX-2	EX-1	EXEVAL	EX+1	EX+2
USAREUR					
CAV			96	88	
ARM		69	83		
MECH2		73	70		
FA1		76	81	81	
FA2	71	81			
MLRS	73	73			
ADA		67	87		
FSB		88	100	83	
ENG		81	78	78	
FORSCOM					
CAV			92	67	67
ARM	67	70	92	79	
MECH	67	67	81	67	
FA	83	79			
MLRS			100		
AH64a			89	78	72
AH64b	78	72	89		
FSB	67	67			
ENG		67	95	67	67

Table Note: Attack Helicopter (AH64) battalion had two EXEVALs, and is shown twice.

The USAREUR engineer battalion and one of the mechanized infantry battalions (MECH2) had declining performance assessments when they were preparing for a CTC or EXEVAL. MECH2 had one company out of country on a stability operation, it changed

battalion commanders in the month of the EXEVAL, it had higher turnover (8-11 percent) in the months near the EXEVAL than at other times (4-6 percent), and it was only able to conduct squad and platoon exercises in the month before the EXEVAL. The engineer unit was supporting units outside the country and performed gunnery and one combined arms STX in the month prior to their EXEVAL. The commanders of these battalions apparently felt that their opportunities to train were not sufficient to raise their Percent METL Trained scores.

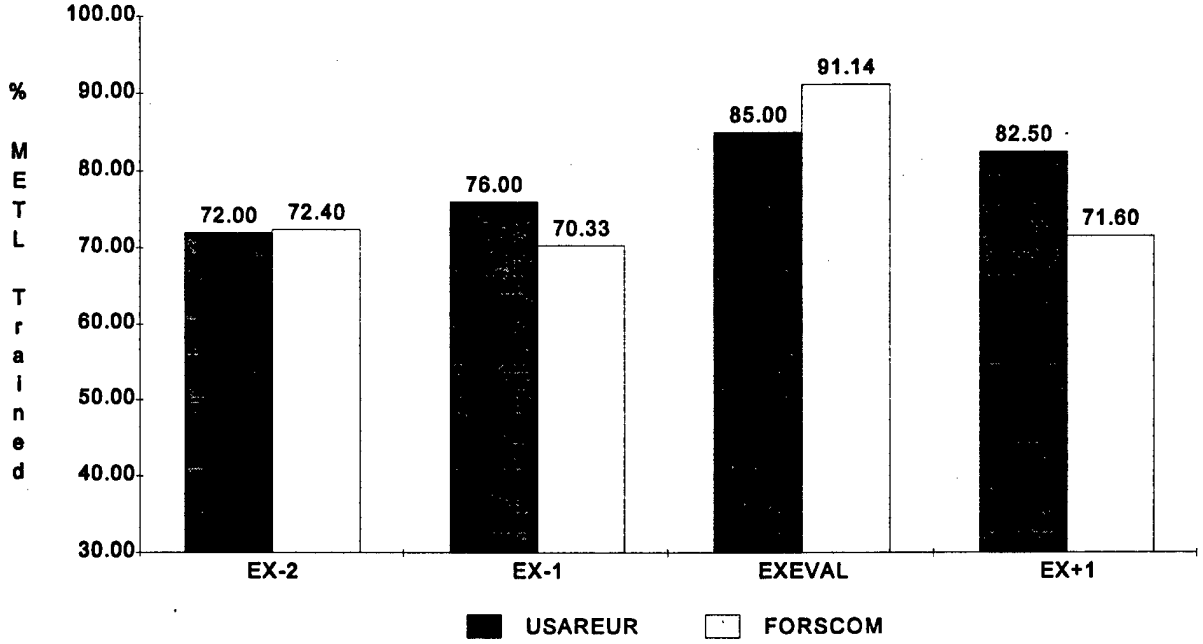

Figure 14. Average Percent METL Trained scores in USAREUR and FORSCOM, reported by quarters aligned to EXEVAL.

There was insufficient information obtained from the FORSCOM engineer battalion and the USAREUR armor, FSB and ADA battalions to describe the training strategy they used prior to their EXEVALs (which occurred at the start of the data collection period).

The Combined Effects of Turnover, Leader Turnover, and Cats-like Training

Table 21 contains information about the test bed units for which there were sufficient data to characterize either the three months prior to an EXEVAL (or CTC), or the three months after such an exercise. The rows of Table 21 are arranged in descending order of the change in Percent METL Trained score. The first two units, representing the build-up to an EXEVAL or CTC, show progressive training opportunities using CATS-like exercises. Both of these units have substantial gains. The other units represent declines after EXEVALs (or CTCs).

Table 21. Turnover and training opportunities for units before and after EXEVALs

Unit	Average Percent Turnover per Month	Leader Turnover	Bn/TF XO or S3 Turnover	Number of CATS-like Exercises Performed	Change in Percent METL Trained	Comments
Three Months before EXEVAL						
FORSCOM: Armor	8	4	0	3	+22	Level II Gunnery; Co/TM EXEVAL and TF CFX/FCX
FORSCOM: MECH	7	4	0	4	+14	Most companies did gunnery through Table XII; Progressive training of platoons and Co/Tms; STAFFEX
Averages:	7.5	4	0	3.5	+18	
Three Months after EXEVAL						
USAREUR: Eng.	6	1	0	1	0	Low turnover
USAREUR: FA1	5	6	2	2	0	High staff turnover; training included gunnery, CPXs; no STXs or FTXs
USAREUR: CAV	14	1	0	1	-8	Very high turnover; used TADSS
FORSCOM: Attack Helicopter	9	4	2	4	-11	High turnover of staff.
USAREUR: FSB	11	2	0	0	-17	Very high turnover, no training
FORSCOM: CAV	9	8	2	3	-25	New equipment; loss of most key staff; training not progressive
FORSCOM: Eng.	13	3	0	2	-28	Very high turnover; gunnery and SEDRE performed; unable to perform TF FTX.
Averages:	9.6	3.6	0.9	1.9	-12.7	

The averages for the two groups indicate that prior to an EXEVAL (or CTC) these test bed units had lower rates of overall turnover and performed more CATS-like exercises than did the test bed units observed after an EXEVAL. Focusing on turnover among leaders (defined here as the battalion commander, S1, S2, S3, S4, XO, FSO and company commanders), there seems to be little difference among the test bed units observed in the two groups. However, it was only among those units that were observed after an EXEVAL that either the battalion S3 or XO turned over, and in all three cases, both of these leaders left and were replaced. These leaders are critical for their roles on the battlefield, and for their roles as training managers.

The two cavalry squadrons make an interesting comparison. The USAREUR squadron retained most of its Percent METL Trained, despite very high turnover and few field training opportunities. (No battalion staff were replaced during this time.) During this three-month period it used about 1100 hours of UCOFT (nearly 50 percent of the squadron's total usage for the fiscal year), 48 hours of PGT (about 20 percent of the squadron's annual use), and 24 hours of SIMNET (26 percent of the squadron's annual use -- the remainder was used in the month prior to the CTC). This use of TADSS may have helped to sustain performance. The FORSCOM squadron had lower turnover and performed more exercises, but had a greater decrement in performance. In the QTBs the commander of this squadron cited the turnover of most of his senior staff and the turn-in of M1A1s and issue of M1A2s as detractors from his unit's capability. Training in this period consisted of a gunnery cycle, an EDRE, and two troop-level STXs. There were no STAFFEXs or TF-level exercises.

The two engineer battalions also make an interesting contrast. The USAREUR battalion performed Co/Tm STXs, which appeared to have allowed them to sustain their level of performance. The FORSCOM battalion had more than twice the rate of turnover and performed a gunnery and a SEDRE, which were not enough to sustain performance. The commander of the FORSCOM battalion wanted to perform a TF FTX, as recommended by the CATS template and calendar, but was unable to obtain the resources needed to perform this exercise.

The attack helicopter battalion is interesting because it scheduled its training differently from the other units: it conducted CATS-like events after the EXEVALs rather than before. When the battalion commander rated performance at the end of the third quarter of FY95 (ca June) the unit had recently performed an EXEVAL as part of a brigade operation. The fourth quarter (July-September) was very active: gunnery cycle, company STXs, battalion FTX, and company STXs concurrent with a division CPX. The commander, however, decremented the performance evaluation of the battalion (from 89 to 78 Percent METL Trained) in the next QTB. Although the overall level of turnover was average (9 percent), the battalion replaced the S2, S3 and XO, as well as the commander of B Company and the first sergeants of B and D companies. This degree of turnover among key personnel may account for the reported decrement in Percent METL Trained.

The next quarter (not represented in Table 21), which led up to a rotation at NTC, was devoid of substantial training opportunities. There was a single, one-day battalion STX.

Helicopter gunnery was curtailed due to shortages of 2.75mm rockets. This is very unlike the performance of the other units, which tended to schedule many company- and battalion-level events in the quarter preceeding an EXEVAL. The battalion commander further decremented his assessment of unit performance (from 78 to 72 Percent METL Trained) in the QTB prepared around December.

The NTC rotation was held, as scheduled, at the beginning of the next calendar year. Following this, the unit again scheduled many sustaining events: company STXs, a battalion STX and participation in a corps-level Warfighter exercise. The QTB prepared in early March showed the unit was again at T-1 (89 Percent METL Trained)[22]. The experience of this battalion seems to confirm that CATS-like training opportunities are critical to sustaining satisfactory levels of performance.

A regression analysis was performed on these data to examine the relationship of the turnover and training factors to change in Percent METL Trained. Using a procedure that determines the best fitting model, the three best predictors of change in Percent METL Trained were the amount of overall turnover, the turnover of the battalion S3 and XO, and the number of CATS-like exercises. Adding leader turnover did not improve the fit of this model. In the regression equation predicting change in Percent METL Trained the two turnover factors had negative weights, and the number of CATS-like exercises had positive weights. The prediction equation accounted for 47 percent of the variance in the change score (after statistical adjustment for over-prediction). The small sample, however, resulted in the equation failing to attain the conventional level of statistical significance (alpha=.05). Nevertheless, these results are important because they are consistent with findings from earlier research.

Hiller, McFann and Lehowicz (1994) showed that OPTEMPO predicts NTC performance of ground maneuver units, a result confirmed by Keesling, Ford and Harrison (1994), using a different data set. Keesling and Ford (1994) re-analyzed the latter data and found that turnover of line company officers had a negative effect on unit performance, making the positive effect of OPTEMPO clearer. The data in this study, which includes many more types of battalions, show that CATS-like exercises (which, for these units, consumed OPTEMPO) were positively related to self-assessments of Percent METL Trained. The data in this study also indicate that turnover has a negative relationship to the same self-assessments. In particular, this study points out that the turnover of the S3 and XO (in this sample either they both turned over, or neither did) was related to an additional decrement in self-assessment. So, although the study results do not attain statistical significance on their own, they are meaningful as confirmations of prior research results.

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[22] This unit is not included as a 'gainer' because data collection ended before all of the data elements in Table 21 could be collected for the period prior to the last QTB.

Discussion and Conclusions

Test bed units reported being at T-1 level only 21 percent of the time. Once they had attained T-1, they typically declined rapidly, probably as a consequence of the levels of turnover reported here. CATS is designed to sustain the level of training proficiency by ensuring that there is a regular cycle of exercises each quarter. The cycle promotes development of proficiency prior to a CTC, and sustainment upon return from the CTC. Brown (1994) proposed a generic training program with similar attention to skill development and sustainment around a capstone CTC rotation. Brown's program relied more heavily than CATS on simulations.

CATS provides a progression of exercises through echelon levels, culminating in a task force exercise every six months. The data show that units that performed a substantial task force level exercise (e.g. a CTC rotation or a TF EXEVAL) were very likely to rate themselves as T-1 during the time immediately prior to, or following, that exercise. In most cases that could be documented, it appeared that they had prepared for this capstone exercise through a CATS-like sequence of preparatory events. Because all of the virtual simulations specified in CATS were not available to the test bed units, these training sequences were field-intensive.

The traditional training paradigm of peaks and valleys did not give way to CATS during the course of this project, so it is not possible to directly evaluate the effects of CATS. The evidence appears strong that if units were able to implement CATS they would be likely to overcome the effects of turnover rates similar to the averages reported by the test bed units (eight or nine percent per month). The evidence is not as clear that units implementing CATS would remain within the band of excellence for a T-1 unit. However, units that did do a field-intensive, CATS-like training program leading to an EXEVAL or CTC rotation usually reported attainment of T-1 status. Finally, it is not possible to state that units implementing CATS would be deployable in less than 14 days. A longer-term study of units implementing CATS is needed to confirm the value of this training paradigm.

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INDEX

APPENDIX A

USER'S GUIDE TO THE COMBINED ARMS TRAINING STRATEGY (CATS)

USER'S GUIDE
TO THE COMBINED ARMS TRAINING STRATEGY (CATS)

INTRODUCTION

This guide is a source reference for all Active and Reserve Component users of CATS[1]. This guide, and the training materials it accompanies, are the result of an 18-month effort sponsored by the Deputy Chief of Staff for Operations and Plans - Training (DCSOPS-TR), and carried out under the direction of the Army Research Institute (ARI), to develop a Combined Arms Training Strategy (CATS) for each of eleven different types of battalions [armor, mechanized infantry, field artillery (155 SP and MRLS), forward support, attack helicopter, air defense artillery (stinger and avenger), light division assault helicopter, the heavy division engineer battalion, and the heavy division cavalry squadron]. The primary audience for this document consists of commanders of the types of battalions for which these CATS were developed. CATS will assist you in the development of short-range and long-range training plans.

The CATS for each unit type is currently available in the form of paper-based matrices and two year calendars. A preliminary version of CATS, which is now obsolete, was incorporated into the Standard Army Training System (SATS), version 4.0, that was recently provided to your command by the Army Training Support Command (ATSC)[2].

CATS includes many training matrices organized into three major functional categories: Fight , Deploy/Redeploy and Sustain. These matrices describe one way of organizing task-based, multi-echelon training into a set of events that will achieve and maintain a high state of training readiness in today's environment of high personnel turbulence and key leader turnover.

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[1] Active Component battalions and squadrons participated, as test bed units, in the development of CATS. Reserve Component units have much different training environments and will need to pay particular attention to the sections of this guide that discuss reviewing and updating the matrices representing the strategy. The matrices representing the strategy for Deploy/Redeploy missions and tasks should be applicable with little updating. The matrices for Sustain missions and tasks will require more work. The matrices for Fight missions and tasks will need the most review and careful updating. For example, Reserve Component units will not have the training resources or opportunities available to Active Component units in a T-1 status. In planning combined arms training in an environment where time and access to field training sites are limited, Reserve Component units should make use of CATS to identify and exploit all opportunities for using TADSS, to include those not reflected in the CATS matrices.

[2] DCSOPS-TR is working with ATSC to incorporate the latest versions of this guide, the validated templates and calendars, and other supporting materials, into future releases of SATS.

The Fight matrix is based on training of the unit's MTOE mission and mission essential task list (METL) and is the most unit-specific. The Deploy/Redeploy and Sustain Matrices address aspects of unit training driven by Major Army Command (MACOM) and local installation considerations. In general, these two matrices are applicable to all Army units. CATS, while primarily a training guide for commanders and unit trainers, can be used by all leaders to integrate individual and collective training with the CATS training events.

CATS is based primarily on the MTP tasks necessary to train a battalion. In order to produce a complete training program, essential tasks not reflected in MTPs were also recognized, generally in staff performance, and are indicated by descriptive titles. These non-MTP tasks have been recommended to Training and Doctrine Command (TRADOC) for development of the appropriate tasks, conditions and standards. The TRADOC proponent schools have agreed to prepare those materials.

The next two sections extend the introduction to provide additional context and background information. The first of these discusses where CATS fits in the unit training planning process and will help you to see how CATS is designed to assist you in carrying out your responsibilities as a training manager. The second section discusses the development of CATS and will help you to understand the scope of echelons and missions for which strategies were developed. Subsequent sections discuss implementing CATS within your training environment.

Where Cats Fits in the Unit Training Planning Process

Commanders in the U.S. Army are the primary training managers and trainers of their organizations. FM 25-100, "Training the Force," requires the commander to:

- Base training on wartime mission requirements.
- Identify applicable Army standards.
- Assess current levels of proficiency.
- Provide the required resources.
- Develop and execute training plans that result in proficient individuals, leaders, and units.

CATS is designed and formatted to provide a tool for you to use in carrying out this guidance. It recognizes that the commander's role as the combined arms training manager is the most important aspect of the Training Management Cycle. The strategy is based on the FM 25-100 Principles of Training. As a result, the CATS templates are uniquely organized to support the development and execution of a combined arms training program.

CATS recognizes that the essence of the Army training mission is to develop and maintain proficiency in the execution of mission essential tasks. CATS also emphasizes that combined arms proficiency must be measured against a clear standard and, therefore, commanders must periodically train under rigorous, realistic conditions designed to challenge all

aspects of unit operations so the commander can make a valid assessment of the readiness of the unit to execute its METL.

CATS matrices for the 11 battalion types are the result of applying a specific methodology to a specific format, resulting in a prototype training strategy. The prototype strategies can be used as they are, or can be easily refined to meet local training conditions. Both of these uses will be illustrated in subsequent sections of this guide.

- The format is designed to make clear all of the various factors and considerations that must go into planning an effective training program. The eight-column template will be addressed in detail in subsequent sections. The format is designed for use at all levels of training management and facilitates vertical and horizontal communication among training managers during the planning process. As you will see, it provides for clear guidance on the training audience for each event, the prerequisite training they must have, and the anticipated outcome of each event. It provides sufficient guidance to your subordinates and your attached/supporting units as they prepare the near-term plan and make their final preparations to execute training.

- The methodology is a step-by-step process for taking account of the factors and considerations in the structured format, and filling in the columns of the template. Following the methodology results in the modification of the prototype training plan and the production of guidance needed for subordinate and attached/support units.

How CATS Was Developed

Headquarters, Department of the Army (HQDA) directed that training requirements for eleven combat, combat support (CS) and combat service support (CSS) battalions be analyzed to develop the initial CATS matrices and calendars. That guidance and direction recognizes the maneuver emphasis of the Army's war fighting doctrine. The training strategies to be developed were to focus on combined arms tasks. Special consideration was to be given to the current training environment, characterized by high personnel turnover and limited resources.

The first step was to develop a generic model -- applicable to all battalions -- for developing the training strategies. A select group of former brigade and battalion commanders with significant experience in training development worked with ODCSOPS-TR, TRADOC proponent schools, and field commanders, to produce this model. The model agreed upon was a methodology and a template consisting of eight columns, to be used to record particular types of information crucial to making training planning decisions. When completed, the template becomes a matrix containing the unit's training strategy. This format was chosen to facilitate, among other uses, your development of training plans and schedules.

The second step was to create prototype training strategies for each unit type by following the methodology described in the next section. Training strategies were developed for training the tasks associated with supporting the following primary combat (Fight) missions:[3]

- Conduct a Tactical Road March
- Occupy an Assembly Area
- Movement to Contact
- Attack
- Defend

Anticipated developments in training doctrine and material were incorporated into the prototype strategies, to include: Army Training XXI (as reflected in Warfighter XXI and Warrior XXI) and the development and deployment of new TADSS, such as the Close Combat Tactical Trainer (CCTT). These prototype strategies were subjected to an iterative cycle of review by the TRADOC proponent schools and by field units in both USAREUR and FORSCOM. The proponent schools made sure the strategies incorporated the latest doctrine and reflected appropriate use of TADSS. The field units examined the feasibility of the training programs and contributed their ideas about suitable media, events, and event sequences. In all cases, the field units and the TRADOC schools agreed upon the final format and content of the strategy.

For purposes of training management and task analysis, the battalion was considered to consist of six echelons: task force (for the maneuver units; battalion for others), staff, company/team, platoon, squad, and individual. The planned and scheduled training activities of each echelon were further subdivided into one of three major functional categories in which the unit may be engaged: Fight, Deploy/ Redeploy, and Sustain. For each battalion type, CATS matrices were developed for each combination of echelon, functional category, and mission.

Each mission was examined by conducting a thorough front-end analysis of each battlefield operating system (BOS) for each type unit. This process revealed that the tasks necessary for staff proficiency were not well defined in current doctrine and that Mission Training Plans (MTPs) did not sufficiently cover unit staffs. A series of BOS-related tasks were developed, which are almost independent of battalion type, and which are performed by almost all types of units.

It was also necessary to develop training activities to address these staff tasks. The echelons within the staff organization require individual and collective skill proficiency, and coordination between and among staff groups must also be trained. Training events and media focused on staff task/skill proficiency were developed as part of CATS. The CATS staff training paradigm starts with training individuals and sections in their functions and responsibilities;

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[3] Complementary missions used to develop training strategies for CS and CSS battalions are listed in Enclosure 1.

progresses to staff group training focused on the interactions among various staff sections; and culminates in a staff exercise (STAFFEX, or other exercise in which the staff must operate as a whole), which brings it all together. Because this material is new, you should study the entire CATS staff training program before trying to implement it.

The Table of Contents that preceeds the CATS matrices lists all of the missions, tasks and echelons for which strategies were developed, for your unit type. The Table of Contents will help you to locate appropriate pages in the matrices when you need to review specific tasks and the appropriate training methods.

Implementing CATS

In this section you will learn how to apply the matrices in your training environment. The first part of this section, which is a kind of 'quick start' introduction to CATS implementation, will show how to use the existing matrices for short-term planning. The second part discusses using the CATS development methodology to review and update the matrices. The third part discusses long-term planning. The first part will serve as a useful introduction to the matrices that you should read even if your first step will be to review and update the matrices. The second part provides more detailed information about the matrices that may be useful, even if you want to proceed directly to planning. Reading both of these sections before you attempt to use the CATS matrices is highly recommended. Before you continue, be sure you have ready access to the following items:

- Enclosure 2 of this document, an extract from a CATS matrix, which is used to illustrate some points in the following paragraphs;
- Copies of the training guidance and calendars from your higher headquarters;
- Your latest assessment of unit performance;
- Enclosure 3, which is a graphic showing the overall methodology, the logical connections between the columns of the matrix, and other factors that influence the content of the matrix;[4]
- The CATS matrices for your type unit.

Using the CATS matrices for short-term planning

Generally, the leader using the matrices for short-term planning will have a METL (or other list of critical tasks in which his unit must be proficient), and will be looking for guidance

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[4]This diagram shows only the steps discussed in this guide. It is not intended to show the complete Training Management Cycle as depicted in FM 25-100, Figure 1-5, which also includes the essential execution, post-execution assessment and feedback phases of the complete process.

about appropriate training methods. The key to using CATS for unit training management is understanding the strategy and its various components. The strategy is organized by functional area and echelon to be trained. It has eight interactive components, expressed as columns in a matrix format. The example at Enclosure 2 is the matrix for one mission/task of an armor battalion task force company team. The columns provide the following information:

- Column One records the mission and supporting tasks requiring training. In the prototype strategies, the entries in Column One consist of the appropriate MTP missions and tasks. Based on your assessment, you will already have a list of tasks most in need of training over the next short-range planning period. You can use the Table of Contents for the matrices about your type of unit to locate these tasks. For purposes of illustration, assume that the commander of an armor company/team has identified 'Attack Enemy Positions' as one task in need of training. He locates this at pages 101-103 of the company/team fight matrix, as shown in Enclosure 2. Column One contains the appropriate field manual (FM) and Army training evaluation program (ARTEP) references. The entire set of related MTP tasks is listed in the last block at the bottom of the last page.

- Column Two shows the desired frequency of, and interval between, repetitions of the task(s). During the trial implementation of CATS, in the summer and fall of 1995, personnel turnover (which averaged eight to nine percent per month) was the main factor determining the frequency of retraining, as perceived by the test bed units. Your unit may experience higher or lower turnover. The frequencies in the CATS matrices were developed based on an average turnover of about eight percent per month. For 'Attack Enemy Positions,' the matrix indicates training should occur every month.

In addition to turnover and turbulence, you should consider other factors that will influence the desired frequency of training. For example, despite the best plans and intentions, some training may not 'take.' So, you may need to conduct additional training to be sure that your unit is making adequate progress. Both the turnover rate and the rate of progress need to be considered in determining how frequently to train over the short term. Assume that the company commander in the example believes that training once a month will be adequate.

- Column Three lists alternative "training means" -- combinations of events and media (live or simulation) -- that might be selected to train this mission/task. You must select an appropriate means for each time you intend to conduct training on the task. Columns Four through Eight are characteristics of each means that must be considered in making those selections. The commander of the example company/team will see that Column Three shows the twelve training opportunities that CATS specifies for training the task 'Assault Enemy Positions' over the course of one year:

    - two FTXs (one that is part of a TF EXEVAL; one that is a company/team EXEVAL within a TF FTX)

    - two STXs (a list of three candidate STXs from the appropriate ARTEP is shown)

- one CALFEX
- one STX (using the PRIME simulator)
- one FCX/CFX conducted in the field
- one FCX/CFX conducted in SIMNET or CCTT
- four exercises using either TEWT, MAPEX, Order Drill, or Company Seminar/Demonstration methods (Janus or sandtable may be used as media for these)

The company commander in the example must determine which of these means is most appropriate to his purposes. If he is planning for three months, he could choose three of these means. It is possible that the calendar for his unit shows one or more means are already planned: for example, the battalion may have an FTX scheduled for the middle month. In this case the company/team commander should look for a means to employ in the first month that will ensure that his unit meets the gate requirements for that battalion/task force FTX. And, he should look for a training means to employ in the month after the TF FTX to sustain his unit's proficiency. Columns Four through Eight contain information about each means that will contribute to making these selections.

- Column Four lists the estimated duration of each means (determined by the event more than by the medium). You will need to be sure that there is time available, given all of the other requirements on units and personnel, to perform the means you select. If a specific facility is needed (e.g., SIMNET), you will need to be sure it is available.

- Column Five shows a means quality rating, related to the cost and realism of the event/medium. When chosing events and media, you will have to balance the resource costs of different training media against the needs for realism and repetition. Generally, as your unit becomes more proficient, realism should increase. This provides for the consistently challenging training environment that is specified in FM 25-100. More realistic exercises also provide you with a much sounder basis for making assessments of your unit's proficiency. Of course, safety concerns indicate that units that have many new members (due to turnover) or that have been diverted from their normal training (e.g., to deal with natural disasters) should not be exposed to very high levels of realism until they meet the prerequisite gates. The commander in the example may feel that his unit is ready for an STX in the month prior to the TF FTX. In the month following the TF FTX, he wants to sustain skills, but doesn't feel that a field exercise is required, so he plans to conduct an FCX/CFX in SIMNET, which he determines will be available for this purpose.

- Column Six identifies the training unit/audience for the event. The information in this column is drawn from the appropriate MTP. The important consideration for the commander will be whether he feels the need to incorporate attached personnel (and equipment) into the

training means. If he does, then he will have to coordinate with the appropriate leaders to be sure that such personnel can be available, and that they will meet the prerequisite training gates. The format of the information in the matrix will facilitate his communication with other commanders to make this happen.

- Column Seven gives the prerequisite training (training 'gates') that should be attained by the members of the training audience prior to the execution of the means in Column 3. If the training audience hasn't attained the specified level of proficiency, the means can not achieve the quality indicated in Column 5. Safety considerations may preclude conducting the training if the proficiency gate is not met. The commander in the example does not anticipate any problems with meeting the proficiency gates.

- Column Eight provides a place to record detailed comments concerning the purpose and desired outcome of each event along with other remarks or guidance. The sample matrix offers many comments about the characteristics of the training means that determine the quality, and about using specific simulations to support some of the events. The commander in the example may wish to consult with personnel at his simulation center to update the information about the suitability of the simulation for the event he wishes to conduct. If, for example, he wants to stress the dismounted assault, he may have to conduct his CFX in the field, rather than in SIMNET.

As the example makes clear, the format of the matrices assists in laying out what has to be done -- what events, how often, who participates, at what level of participation, etc. CATS matrices can be used to facilitate coordination of training between supporting echelons and supporting/supported units.

Using the CATS development methodology to review and update the prototype matrices

The test bed units and the TRADOC proponent schools judged that the CATS matrices provided excellent guidance for developing training plans based on the training resources available to units in 1995. Your unit may receive new equipment, TADSS, or other changes that affect your training environment, before CATS can be reissued to reflect such changes. Also, your unit may develop specific approaches to training -- from identification of unique tasks, to design of specific training exercises -- that will require refinement of the CATS matrices. This part of the guide is about making such refinements. Each column is discussed, in turn, indicating what factors should be reviewed in updating the content of the matrix. The figure at Enclosure 3 illustrates the relationships among these factors and the content of the matrices.

Column One - Mission/Task: The CATS are task-based strategies. Column One is the place to record the missions and mission essential tasks to be trained. This is where you would add tasks. The prototype matrices are comprehensive, because they were developed to cover a two-year training calendar. They are generic, in that they reflect the MTP tasks and other generally applicable tasks. You will need to include the specific guidance provided by your higher commander. You should carefully examine the T&EOs of the MTPs for your unit and its

subordinate units (T&EOs are found in Chapter 3 of each MTP), and develop as comprehensive a list as you can so that your training plan provides sustainment training for all tasks.

There are some tasks listed in the prototype matrices which are not found in MTPs and do not yet have approved T&EOs, particularly in the staff echelon; those tasks are numbered as "XX-X-XXXX." In some cases, these are "parent" tasks, with already well-defined subtasks. In others, the subtask currently lacks definition and is listed, for example, as "05-5-XXXX." You may want to add other tasks, using the same notational conventions. To make use of these tasks, your unit will have to prepare a draft T&EO describing the conditions and standards for your training until the TRADOC proponent can publish an approved version.

Each echelon within a unit should coordinate with the echelon above and below to ensure that the tasks to be trained by each echelon support the tasks identified at the next higher level. The CATS matrix format can be used to facilitate this coordination. The prototype matrices reflect coordination among echelons.

Column Two- Frequency/Interval: The next step is the determination of the frequency with which training is required, and the optimum interval between training periods on a given task needed to sustain "go to war" proficiency. Here again, the CATS matrices you have received are generic in that they reflect the turnover rates in effect during the trial implementation of CATS (summer and fall of 1995). These rates averaged eight to nine percent per month, and were considered to be the primary factor determining the need to retrain. You must estimate the effect of turnover and turbulence (both overall, and of key personnel) within your own unit. You also should consider forgetting or skill decay. These factors must be assessed for the tasks currently in the CATS matrix, and for those tasks you may have added to Column One. You should consult your higher commander and his staff, your staff, and your subordinate commanders to help you arrive at the determination of frequency. Column Two provides you with the basis for justifing requests for training time and other resources.

Column Three - Means: (Events and Media): This is the central element of the strategy; the entries in the subsequent columns are further descriptors of the means. You continue to apply the methodology by updating the selection of means to reflect local training conditions. Perhaps your unit has access to a new TADSS before it has been made available to other units. Or, maybe your unit has developed a particularly effective training exercise that is unique to your post. Or, perhaps your unit does not have access to a TADSS (e.g., SIMNET or CCTT) that is specified in Column Three of the CATS matrices. You should go through the matrices and add the new training means, to be sure that they are considered when it is time to make selections in building a training plan. However, it may not be as useful to strike out the means that are not applicable to your unit; you can eliminate them from consideration when you make selections. Knowing the distinction between events and media is important and will help you to update the matrices more effectively.

Events are scheduled training activities selected by commanders for practicing tasks. The event selection normally determines the audience (echelon) and level of task resolution to be trained (partial or subtask). The list of possible events is defined in FM 25-100 and FM 25-101. **Media** (shown on the matrices in parentheses) are best understood as Training Aids, Devices, Simulators and Simulations (TADSS), in the most generic sense.

A common misunderstanding is to construe the medium as the event. Thus, commanders will talk about a JANUS or SIMNET exercise without specifying the corresponding training event in FM 25-100 or FM 25-101 (e.g., CPX or STX). In part, this reflects the fact that complete training support packages (TSPs) for conducting such events in any of these media have been developed only very recently, and only for some event/media combinations.[5] Training in JANUS or SIMNET is often a kind of free-form play, which may be interesting, and even beneficial, but does not have the rigor of a serious training event with appropriate supporting personnel (acting as OPFOR and OCs, for example) and AARs. You should be sure that you specify both the event and the medium when you update Column Three. If you add new means, you will need to fill out columns four through eight. You will need to review these columns for all the other means listed in the matrices.

Column Four- Estimated Duration: This column is self explanatory. The estimated duration shown in the CATS matrices refers specifically to the time required to train the task. It includes time to practice all three phases of a tactical mission (plan, prepare, and execute), as well as time for after-action reviews and limited re-execution as necessary. If you have added new means you will need to fill in values for duration.

Column Five - Means Quality A-D: The ideas presented in the above paragraphs are complex. Column Five of the prototype matrices summarizes these complexities with a quality rating of each training means. These quality ratings relate to several characteristics of the training means. They are correlated with:

1) the realism of the means -- the degree to which the cues and responses are like those in the combat environment;

2) the accuracy of proficiency assessments based on performance using this means;

3) the OPTEMPO cost of the means.

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[5] TSPs have been developed for STX-like events within SIMNET for armor and mechanized infantry platoons, company/teams and task forces, and for similar units of cavalry squadrons. Because the computer simulation is repeatable, it enhances the efficiency of the training: resetting to re-run the same scenario, or changing configurations of terrain or forces, does not require much time or consume appreciable resources. As TSPs are developed (by the Army, or at your home station) for other events, you may need to update your CATS matrices to keep them up-to-date until the Army can publish revisions.

Generally, the A-level means are the most expensive, the most realistic, and provide the best environment in which to assess the proficiency of the unit. D-level means are quite inexpensive, not very realistic, and unit performance does not relate directly to performance under combat conditions. As your home station, or the proponent institutions, produce more TSPs, develop other training guidance, or upgrade media, these ratings may no longer apply. You should use your own professional background and experience, in combination with Task Performance Support Codes (TPSCs), to determine how useful any particular means will be.

An "A" level means is identified as a CTC deployment and training activity, or other, similar deployment and training. The fidelity (realism) achieved by the terrain, simulations, simulators and opposing force provides a unit with the opportunity to execute at the highest level short of combat. A commander will have great confidence in his assessment of his unit's proficiency based on that experience. At the CTCs the Army brings to bear considerable resources not found at home station to conduct training under the most accurate near-combat conditions possible and provide a highly accurate evaluation and feedback process.

A "B" level means is described as a high fidelity home station training exercise. It is a multi-echelon training experience with the participation of all elements of the unit needed to insure accurate cues and responses. A "B" event will have well trained and sufficient OPFOR and appropriate OCs. The commander should have confidence in the accuracy of his unit performance assessment based on a B-level means.

A "C" level means is described as a partial task training exercise. It is deliberately limited by the trainer to focus on either a part of the task (performed by the full unit), or only a part of the unit (performing the full task). Typically, the resources for these means are limited to those available to the commander whose unit is being trained. This limits the availability of OPFOR and OCs, for example. The commander should be confident that learning that takes place in this means will transfer to B-level means. However, the conditions were deliberately set so that he may not directly translate that assessment to combat proficiency for his full unit executing the full task. "C" level means are an important part of the CATS: they provide individual and collective training necessary to attain the proficiency needed to participate safely and effectively in a "B" event, or to sustain a high level of proficiency obtained during a recent "A" or "B" event without expending a large amount of resources.

A "D" level means is described as a subtask training exercise. It is deliberately limited by the trainer to focus on a complete subtask (not linked to other subtasks), or a complete subunit (not linked to other subunits), or an individual. The complete appropriate audience for the task is present. Again, the resources will be limited to those the unit commander can provide. After this training, the commander should be confident that the individual or subunit can accomplish the task safely and effectively in a "C" exercise.

Column Six - Training Unit/Audience: This column is also self explanatory. You will easily identify the soldiers and units required to participate in a training activity after you define the task, echelon and means. When you add means to the matrices, you will need to include this

information. The CATS matrices can serve to coordinate training requirements with the appropriate units that provide the "slice" elements. When used in conjunction with Column Three (Means) and Column Seven (Prerequisite Training/Gates), you specify the training to be accomplished using a given means, and the skills that each subordinate or "slice" element must bring to the event. The training proficiency of the slice and supporting elements is an important element of the preparation for "A" and "B" events. An armor task force can not effectively benefit from an "A" event if its supporting forward support battalion is not trained to the same level. Column six and column seven should be carefully considered when conducting quarterly training briefings and weekly training meetings.

Column Seven- Prerequisite Training/Gates: This column is critical to effective and safe implementation of training. Used properly, it insures efficient use of training time during scheduled events. It forces the training manager to specifically think through what he is going to train during an event and what skills the training audience must demonstrate prior to the event. It provides training guidance and suspenses to subordinate units (to include Sergeant's Time tasks). It permits the establishment of safety certification guidance for risk avoidance if needed. It allows commanders to design effective training support packages for the upcoming event or prerequisite training. Finally, it is key to developing in the chain of command a shared vision of the commanders's intent. This vision focuses on task proficiency and what specific elements of each task the chain of command expects to see improved as a result of a training period. These data also help to develop remedial or newcomer training to reduce the impact of turnover and turbulence. You must be sure that your update of the matrix reflects the appropriate training prerequisites for all elements of the training audience.

It should be noted that this system is not intended to force you into a lock-step training sequence. Rather, the training program should be based on assessment of proficiency at all echelons (and for all attached and supporting units). The assessment levels and tasks listed in this model are the result of analysis and feedback during observation in the field. As you implement this strategy, you will be better able to determine appropriate gates for your unit, tied to specific events and media.

Column Eight - Comments: This column is a place to personalize your training strategy and to add specific training guidance to your plan. As completed in the CATS matrices you have received, the comments are generally about the overall purpose of a means and the outcome anticipated, and may contain remarks drawing attention to particular features of a means (e.g., some specific items a TADSS may be especially good or poor at training). As you add means or review the means in the matrices you may want to augment or modify these general remarks. For example, your training areas may not support full-sized doctrinal maneuver boxes, and you may wish to comment on how training should adapt to this limitation. When you develop a specific plan, these comments can be focused more specifically on the actual means as you intend to employ it. **Purpose :** This comment is to describe the purpose of your means (event/media) as they relate to your overall training strategy. For example, "to provide an opportunity for the staff to practice orders development prior to the CPX next quarter" or "to prepare the company to participate in next week's battalion FCX." **Outcome:** This comment is

to describe the unit's accomplishment in terms of the tasks trained relative to the means used. This is not the same as the standard in the MTP; it usually is a subset of the standard which can be best trained by the media used in a given event. **Remarks:** This portion is intended for any coordinating instructions the commander deems appropriate. It is here that you may want to discuss any constraints posed by TADSS, such as the fact that most constructive simulations are only part task trainers and must be supplemented by other media to fully train most tasks.

This discussion has emphasized the Fight category. Similar processes must be applied to the Sustain and Deploy/Redeploy matrices. The totality of the training challenge is in integrating the three functional categories. You should study these categories in conjunction with the Fight category so that you understand the interfaces and distinctions between all three. The two-year calendar, described below, will assist you to see how the prototype matrices are integrated.

Developing a long-range training plan

The previous two sections have given you a solid grounding in the meaning of the columns of the CATS matrices. This section examines the development of a long-range training plan using the information in your (updated) matrices.

In addition to the materials you have been examining thus far, you will also need a large sheet of paper sectioned into columns like the CATS matrices. You will also need a blank calendar, similar to the two-year calendar attached to the end of the matrices. Now you will be planning a training program: you will be making choices from the CATS matrices and placing them on the calendar to create this plan. Again, the approach will be to consider each column in turn.

Column One. You should transcribe all of the tasks on which you must train into Column One of the blank sheet of paper. You want to be sure to consider them all in the following steps. Any other guidance you have received about the proficiencies expected of your unit should also be included in this column.

Column Two. There are several factors to consider in this step. Your current assessment of proficiency (T-P-U ratings made quarterly, or after a training event) will identify any deficiencies that must be addressed during the training period for which you are developing plans. Turnover, turbulence, and skill decay will play an increasing role, the longer the period for which you are planning. You will need to adjust the frequency shown in the CATS matrices to reflect your most current conditions and your projections for the future.

Column Three. An important characteristic of the CATS matrices is that Column Three contains a wide variety of means for training. You need to consider these alternatives and determine, given the frequency of repetition you desire, the degree of realism needed to attain proficiency, and the resources available (time, OPTEMPO, TADSS), which of the means should be used each time you want to conduct training on a mission/task.

The key consideration when choosing the medium within which to perform an event is the trade-off between training value and cost. You need to choose the medium that most enhances task learning based on your determination of what aspect of that task you want to practice at each repetition. You do not always need to choose the most expensive medium (usually field training). "Command and Control" of the battalion can be trained in a CPX. The event title "CPX" generally describes who will participate and the scope of the event. The media for this event could be a Major Event List (MEL), JANUS, or CCTT. Likewise, "Platoon in the Attack" can be trained in a situational training exercise (STX). Again, the event title "STX" generally denotes who will participate and some type of lane training. The media for the STX also can vary widely (e.g., MILES and OPFOR, live fire, PRIME, SIMNET, or a sandtable).

Generally, your unit will progress in proficiency from 'crawl,' to 'walk', to 'run.' Crawl-level training experiences do not need to be of the highest realism or cost. Realism should be increased as your unit becomes more proficient. For some tasks and skills, table-type training will be very adequate at the run level. Armor platoon gunnery tables are a good example. For other tasks, an STX may be more appropriate. STXs performed in a simulation environment (e.g., SIMNET) can combine freedom of action for your unit with repeatable OPFOR presentations (like a table). The repeated trials will permit your unit to gain and sharpen skills, or sustain skills following a field event.

At this point, you must, of course, assess the availability of the TADSS you desire to use, along with the availability of other necessary training facilities. The key is to determine the best means to gain, retain, or polish task proficiency in the context of your overall plan.

When you determined the frequency of training repetitions (Column Two) you established a need for a certain amount of training time. When you choose the training means (the combination of event and medium) for each repetition, you are creating a resource requirement. The process of coordinating the requirements through the echelons, facilitated by the CATS format and methodology, should enable you to obtain the resources needed to attain the level of proficiency you and your commander determine is appropriate. You and your higher commander are negotiating a kind of agreement in which you both concur that your unit will attain a specified level of proficiency if it is provided with certain training resources. The use of multi-echelon training as described in FM 25-100, and the use of well developed simulations are the keys to establishing a viable training program in an environment of constrained resources.

You will need to make a list of the training means you want to use over the planning period, and you may find it helpful to enter these into a calendar format. The prototype CATS were developed around a two-year training calendar. The two year model was chosen as the optimal period for the calendar because of CTC rotation frequency and command tour lengths. The prototype calendar integrates all three functional categories (Fight, Deploy/Redeploy, and

Sustain).[6] Putting the strategies into a calendar format ensured a proper sequential flow of events, and compatibility among commitments across the echelons and functional areas. You may need to perform a similar check over the training period for which you are planning.

This sample calendar shows the time allocated to training activities. The local commanders will apportion the remaining time to such things as: local command directives, post support cycles, "ready brigades", "green ramp units", red-amber-green periods, and the many other non-warfighting taskings which have significant impact on all units. Note that the training effort depicted is cyclical in nature. Cycling events and tasks every 3 to 6 months enables the unit to sustain proficiency within the "band of excellence."

Column Four. The fight matrices show the time required to practice the plan, prepare and execute phases of a tactical mission. In creating your training plan, you can modify these time requirements if, for example, you desire to focus only on the execute phase. You should use these values to fill in your calendar, to be sure that there is time available for the means you have chosen. The calendar format can also be used to coordinate with higher headquarters and other personnel to be sure that the facilities you desire will be available when you need them.

Column Five. You should be sure that the means quality is appropriate to the proficiency level attained by your unit, and that you are progressively increasing the training challenge by increasing the realism of the training means. You also want to be sure that the realism of the means is sufficient to allow you to develop a sound assessment of the proficiency of your unit so that you may progress safely and efficiently to subsequent training means. You should annotate the quality of the means on your planning version of the matrix. Be sure to incorporate any appropriate remarks into column eight.

Column Six. For each means you select you will need to be sure that you coordinate with the appropriate headquarters to assure that the desired training audience will be present. You should transcribe the membership of the training audience into column six of the planning matrix. Be sure to incorporate appropriate notes about gate proficiencies for these personnel in columns seven and eight.

Column Seven. You must record the gate proficiencies for the personnel in the training audience in this column. This will be a useful tool to use in coordinating with higher and subordinate headquarters, and with attached/supporting units.

Column Eight. As you see the training plan developing, you should be sure to include specific notes here about the purpose and outcome of the means you have selected, as well as any remarks that will assist you in coordinating with other personnel. The remarks could also include any special conditions that you want to implement or emphasize during the training.

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[6] Note that space limitations allowed only the major unit activities to be indicated on the calendar: unit training schedules will show all events from all echelons and functional areas.

At the end of this exercise, you should have a much shorter version of the CATS matrices, which focuses on your unit's proficiencies and your selection of training means. You will have a tentative calendar to use in coordinating your requirements for resources with other headquarters and personnel, and a clear vision of the progress (through the training gates) your unit should make as the plan is implemented.

FEEDBACK REQUESTED

Although 21 Active Component units participated in the field review of CATS, it is probably impossible to anticipate all of the different training environments in which CATS will be applied. Your unit may realize some particular benefit from CATS, or may experience a frustration in attempting to implement it. The only way the Army can be sure that the product is useful, is if you provide feedback on your experiences. If you have comments on the format or content of the CATS products, or their implementation in SATS (or any future means of delivery), please feel free to provide your thoughts and ideas directly to your Branch proponent.

Enclosure 1

Listing of Combat Support and Combat Service Support Missions

Air Defense Artillery Battalion (Avenger)
- Provide Air Defense Against Low-Altitude Hostile Aircraft for Corps and/or Joint Forces, Areas or Installations

Air Defense Artillery Battalion (Heavy-Stinger)
- Provide Air Defense Against Low-Altitude Hostile Aircraft
- Provide Ground Fire Against Surface Targets

Assault Helicopter (UH-60) Battalion
- Conduct Air Movement
- Conduct Air Assault
- Conduct Command and Control Operations
- Conduct Signals Intelligence/Electronic Warfare Operations

Attack Helicopter (AH-64) Battalion/Squadron
- Conduct Tactical Movement (Ground)
- Conduct Tactical Movement (Air)
- Conduct Assembly Area Operations
- Conduct Reconnaissance
- Conduct an Attack
- Conduct Air Assault Security
- Provide Combat Support and Combat Service Support

Cavalry Squadron (Heavy Division)
- Conduct Reconnaissance Operations
- Conduct Security Operations
- Conduct Economy of Force Missions
- Conduct Tactical Road March
- Conduct Assembly Area Operations

Engineer Battalion, Engineer Brigade, Heavy Division
- Conduct Mobility Operations
- Conduct Countermobility Operations
- Conduct Survivability Operations
- Conduct Tactical Road March
- Conduct Assembly Area Operations

Field Artillery Battalion (155mm Self-Propelled Howitzer)

- Deliver Fires
- Acquire Targets
- Coordinate Fire Support
- Communicate
- Move
- Maintain and Resupply
- Survive

Field Artillery Battalion (Multiple Launch Rocket System)

- Deliver Fires
- Communicate
- Move
- Maintain and Resupply
- Survive

Forward Support Battalion (Heavy Division)

- Plan Combat Service Support Operations
- Relocate the Brigade Support Area
- Establish the Brigade Support Area
- Provide Combat Service Support
- Coordinate Rear Operations

Enclosure 2

Sample Template

((Pages 101-103 of Armor Battalion Task Force Company Team CATS Template: Movement to Contact/Attack: Attack Enemy Positions (Assault Mounted and Dismounted).))

CATS TASK TEMPLATE

ARMOR BATTALION TASK FORCE
COMPANY TEAM

FIGHT

Mission/Tasks	Freq/ Interval	Means Event (Media)	Estimated Duration	Means Quality A-D	Training Unit Audience	Prerequisite Training Gates	Comments: (Includes purpose of event; outcome supported; remarks about execution of the event; constraints posed by TADSS/et al)
MOVEMENT TO CONTACT/ATTACK							
ATTACK ENEMY POSITIONS (ASSAULT MOUNTED & DISMOUNTED) **(17-2-0326 & 17-2-0310)** The situational context of Attack Enemy Positions (Assault Mounted and Dismounted) operations and related tasks is determined by the commander's METL assessment as discussed in FM 25-100. ARTEP 71-1-MTP tasks that may be included are: 17-2-0310; 17-2-0326 Ref: FM 71-1, pg 3-26 to 3-27	12/Monthly (Events must include 2 FTXs and 2 STXs. Eight other events are selected from the Means column)	2 - FTX 1 - FTX (MILES - Done as part of TF EXEVAL) 1 - FTX (MILES - Co/Tm EXEVAL done as part of TF FTX (FTXs may include embedded STXs))	5 Hours (Time based on tactical scenario. Includes time for plan, prepare, execute, AAR, and repeat of execution phase as necessary. Additionally, a Bn level Road March will be conducted as part of each FTX)	B	Full Co/Tm w/all systems (incl FIST & any other attachments)	Subordinate forces and leaders are assessed at "T" level in all supporting tasks: **Company & Attachments** - 17-2-0328, 0306, 0311, 0308, 0401; 44-2-C002; 19-2-C004. **Co/Tm Cdr/XO** - 04-3312.03-0017; 01-1241.00-0008, 0014; 01-1242.00-0022; 01-1243.00-0016. **Tank Plt** - 17-3-0105, 0217, 0219, 0220, 0401, 44-3-C001, C002. **Tank Plt Ldr** - 01-1241.00-0037, 01-1240.00-0030, 01-1241.00-0038, 01-1241.00-0032. **Tank Plt Sgt** - 071-326-5502; 171-091-1019; 171-121-3009, 4031, 4032; 051-192-4046. **Mech Plt** - 7-3-1006; 7-3/4-1011; 7-3/4-1012; 7-3/4-1015; 7-3/4-1013; 7-3/4-1014. **Mech Battle Drills** - 1, 5, 6, 7, & 9. **Mech Plt Ldr** - 04-3311.02-0001; 04-3312.02-0004; 04-3312.02-0005; 04-3312.02-0011. **Mech Plt Sgt** - 071-326-5502, 5910, 5911, 5912; 071-420-0005.	**PURPOSE:** The purpose of the FTX is to confirm and enhance Co/Tm proficiency for mission planning, preparation, and execution of the Attack. **OUTCOME:** The Co/Tm can successfully plan, prepare, and execute an Attack under high fidelity simulated combat conditions. **REMARKS:** This event is fully resourced and supported with appropriate equipment, personnel, and land, as well as OPFOR and OCs. Troop leading procedures, orders, rehearsals, and other readiness activities are embedded in the scenario. Operations are conducted continuously for the duration of the exercise (day/night) at a "run" pace. AARs are conducted at appropriate intervals.
		2 - STX (Field) (MILES) Co/Tm directed events with Co/Tm or Plt focus. Scenario/tasks to be trained determined by the Cdr. ARTEP 71-1-MTP recommends the following: STX D Assault Enemy Object STX I Conduct Raid STX G Assault Enemy Position	4 Hours (Time based on tactical scenario. Includes time for plan, prepare, execute, AAR, and repeat of execution phase as necessary)	B	Full Co/Tm w/all systems (may include attachments)	Subordinate forces and leaders are assessed at "T" level in all supporting tasks: **Company & Attachments** - 17-2-0328, 0306, 0311, 0308, 0401; 44-2-C002; 19-2-C004. **Co/Tm Cdr/XO** - 04-3312.03-0017; 01-1241.00-0008, 0014; 01-1242.00-0022; 01-1243.00-0016. **Tank Plt** - 17-3-0105, 0217, 0219, 0220, 0401; 44-3-C001, C002. **Tank Plt Ldr** - 01-1241.00-0037; 01-1240.00-0030, 01-1241.00-0038, 01-1241.00-0032. **Tank Plt Sgt** - 071-326-5502; 171-091-1019; 171-121-3009, 4031, 4032; 051-192-4046. **Mech Plt** - 7-3-1006; 7-3/4-1011; 7-3/4-1012; 7-3/4-1015; 7-3/4-1013; 7-3/4-1014. **Mech Battle Drills** - 1, 5, 6, 7, & 9. **Mech Plt Ldr** - 04-3311.02-0001; 04-3312.02-0004; 04-3312.02-0005; 04-3312.02-0011. **Mech Plt Sgt** - 071-326-5502, 5910, 5911, 5912; 071-420-0005.	**PURPOSE:** The purpose of STX training is to sequentially link selected drills and tasks into a tactical scenario which replicates a tactical environment. **OUTCOME:** The Co/Tm can successfully plan, prepare, and execute an Attack in simulated combat conditions. **REMARKS:** This event is fully resourced and supported with appropriate equipment, personnel, ammunition, and land, as well as OPFOR and OCs. Troop leading procedures, orders, rehearsals, and other readiness activities are embedded in the scenario. The training is conducted in a lanes training environment and may require multiple iterations of each STX lane until the desired level of proficiency is reached. The capability to run multiple iterations reduces the time required for planning and preparation tasks. As such, several lanes designed to train the same STX are necessary, as is the ability to modify conditions (number of OPFOR, difficulty of obstacle, etc.) to accommodate team start proficiency levels. AARs are conducted at appropriate intervals.

CATS TASK TEMPLATE

ARMOR BATTALION TASK FORCE
COMPANY TEAM

FIGHT

Mission/Tasks	Freq/ Interval	Means Event (Media)	Estimated Duration	Means Quality A-D	Training Unit Audience	Prerequisite Training Gates	Comments: (Includes purpose of event; outcome supported; remarks about execution of the event; constraints posed by TADSS/et al)
		CALFEX (TWGSS/PGS)	4 Hours (Time based on tactical scenario. Includes time for plan, prepare, execute, AAR, and repeat of execution phase as necessary)	B	Full Co/Tm w/all systems & attachments	Subordinate forces and leaders are assessed at "T" level in all supporting tasks: **Company & Attachments** - 17-2-0328, 0306, 0311, 0308, 0401; 44-2-C002; 19-2-C004. **Co/Tm Cdr/XO** - 04-3312.03-0017; 01-1241.00-0008, 0014; 01-1242.00-0022; 01-1243.00-0016. **Tank Plt** - 17-3-0105, 0217, 0219, 0220, 0401, 44-3-C001, C002. Successful completion of TGT VII. **Tank Plt Ldr** - 01-1241.00-0037; 01-1240.00-0030, 01-1241.00-0038; 01-1241.00-0032. **Tank Plt Sgt** - 071-326-5502; 171-091-1019; 171-121-3009, 4031, 4032; 051-192-4046. **Mech Plt** - 7-3-1006; 7-3/4-1011; 7-3/4-1012; 7-3/4-1015; 7-3/4-1013; 7-3/4-1014. **Mech Battle Drills** - 1, 5, 6, 7, & 9. **Mech Plt Ldr** - 04-3311.02-0001; 04-3312.02-0004; 04-3312.02-0005; 04-3312.02-0011. **Mech Plt Sgt** - 071-326-5502, 5910, 5911, 5912; 071-420-0005.	**PURPOSE:** The purpose of the CALFEX is to instill confidence and discipline in the integrated application of all organic and supporting weapon systems in an Attack. **OUTCOME:** The Co/Tm can successfully apply appropriate tactics. techniques, and procedures to command, control, and distribute effective fires in an Attack. **REMARKS:** This event is fully resourced and supported with appropriate equipment, personnel, ammunition, and land, as well as OCs. Scenarios are developed by higher headquarters and include targets for all organic and supporting weapon systems. Selected external support such as CSS and range control assets are necessary. Scenarios can be constructed in a mission of STX configuration and can be adjusted (night, NBC, etc.) as to level of difficulty. MILES/TWGSS/PGS is required. Troop leading procedures, orders, rehearsals, and other readiness activities are embedded in the scenario. AARs are conducted at appropriate intervals.
		- STX (PRIME) - FCX/CFX (Field) - FCX/CFX (SIMNET/CCTT)	4 Hours (Time based on tactical scenario. Includes time for plan, prepare, execute, AAR, and repeat of execution phase as necessary)	C/B (see remarks)	Full Co/Tm w/all systems and attachments for PRIME. Attachments may be incl in FCX/CFX	Subordinate forces and leaders are assessed at "P" level in all supporting tasks: **Company & Attachments** - 17-2-0328, 0306, 0311, 0308, 0401; 44-2-C002; 19-2-C004. **Co/Tm Cdr/XO** - 04-3312.03-0017; 01-1241.00-0008, 0014; 01-1242.00-0022; 01-1243.00-0016. **Tank Plt** - 17-3-0105, 0217, 0219, 0220, 0401; 44-3-C001, C002. **Tank Plt Ldr** - 01-1241.00-0037; 01-1240.00-0030, 01-1241.00-0038; 01-1241.00-0032. **Tank Plt Sgt** - 071-326-5502; 171-091-1019; 171-121-3009, 4031, 4032; 051-192-4046. **Mech Plt** - 7-3-1006; 7-3/4-1011; 7-3/4-1012; 7-3/4-1015; 7-3/4-1013; 7-3/4-1014. **Mech Battle Drills** - 1, 5, 6, 7, & 9. **Mech Plt Ldr** - 04-3311.02-0001; 04-3312.02-0004; 04-3312.02-0005; 04-3312.02-0011. **Mech Plt Sgt** - 071-326-5502, 5910, 5911, 5912; 071-420-0005.	**PURPOSE:** The purpose of this training is to increase the tactical proficiency of the mounted component of the Co/Tm and provide the leadership an opportunity to exercise command and control over maneuver and fires while consuming minimum resources. **OUTCOME:** The mounted component of the Co/Tm demonstrates satisfactory proficiency in the conduct of an Attack on a synthetic battlefield. **REMARKS:** For Armor Co/Tms tactical simulations are part trainers. These devices can provide valuable training for the mounted elements and associated command and control aspects, but they are not capable of exercising the dismounted components. Troop leading procedures, orders, rehearsals, and other readiness activities are embedded in the scenario. AARs are conducted at appropriate intervals. The leader training focus reduces the time required for planning and preparation tasks permitting multiple iterations of events. The use of a SIMNET/CCTT facility reduces OPTEMPO expenditures, real logistics requirements, real movement time, land requirements, and recovery time. This event may be resourced with appropriate OCs, an uncooperative OPFOR, appropriate cues and responses, and a formal evaluation feedback process (AAR). If all these conditions are met, the event may be considered "B" quality. Limited SIMNET training support packages enhance training utility. (Training support packages are available from Fort Knox-SIMUTA project). FCX will require interaction with Bn S3 & FSO; may require interaction with DS Bn S3 & FDC by Co FSO

CATS TASK TEMPLATE

ARMOR BATTALION TASK FORCE
COMPANY TEAM

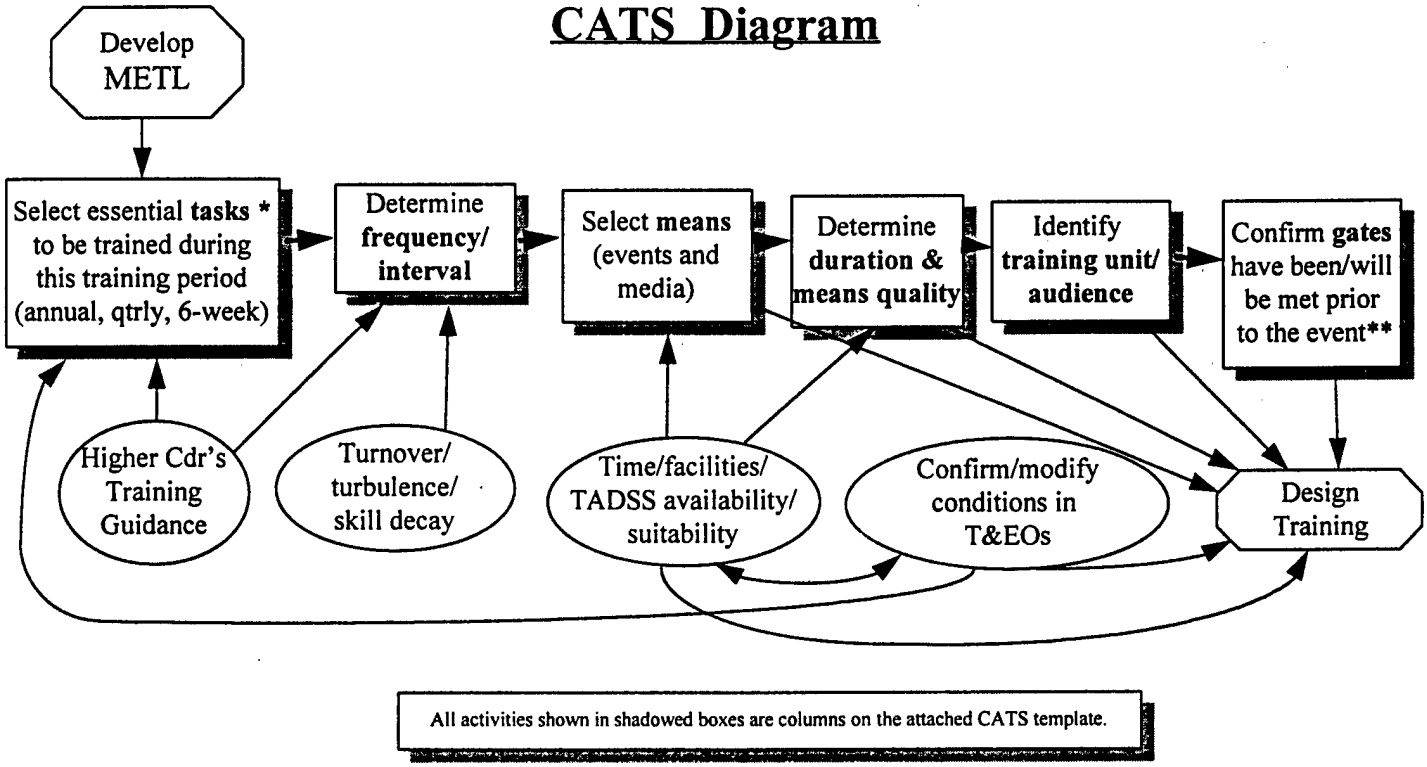
FIGHT

Mission/Tasks	Freq/ Interval	Means Event (Media)	Estimated Duration	Means Quality A-D	Training Unit Audience	Prerequisite Training Gates	Comments: (Includes purpose of event; outcome supported; remarks about execution of the event; constraints posed by TADSS/et al)
		TEWT, MAPEX, Orders Drill, Company Seminar/ Demonstration (JANUS, Sandtable)	2 Hours (per event)	D	All key personnel, limited vehicles in TEWT	Subordinate forces and leaders review and understand performance of embedded and supporting tasks: **Company & Attachments** - 17-2-0328, 0306, 0311, 0308, 0401; 44-2-C002; 19-2-C004. **Co/Tm Cdr/XO** - 04-3312.03-0017; 01-1241.00-0008, 0014; 01-1242.00-0022; 01-1243.00-0016. **Tank Plt** - 17-3-0105, 0217, 0219, 0220, 0401, 44-3-C001, C002. **Tank Plt Ldr** - 01-1241.00-0037; 01-1240.00-0030, 01-1241.00-0038; 01-1241.00-0032. **Tank Plt Sgt** - 071-326-5502; 171-091-1019; 171-121-3009, 4031, 4032; 051-192-4046 **Mech Plt** - 7-3-1006; 7-3/4-1011; 7-3/4-1012; 7-3/4-1015; 7-3/4-1013; 7-3/4-1014. **Mech Battle Drills** - 1, 5, 6, 7, & 9. **Mech Plt Ldr** - 04-3311.02-0001; 04-3312.02-0004; 04-3312.02-0005; 04-3312.02-0011. **Mech Plt Sgt** - 071-326-5502, 5910, 5911, 5912; 071-420-0005.	**PURPOSE:** The purpose is to provide the integrated tactical framework within which the Co/Tm will operate in the field. **OUTCOME:** The Co/Tm understands expected actions and is capable of executing them as a unified team in an operational environment. **REMARKS:** This training assists the company leadership to function as an effective team; exchanging info; preparing estimates; giving appraisals, recommendations & decisions; preparing plans; issuing orders & coordinating their execution. For JANUS company leadership replicate a battle from inside the computer complex. Although limited in scope, JANUS provides an opportunity for the Co/Tm to integrate maneuver and fires, ADA, Aviation, and Engineer support. The leader training focus reduces the time required for planning and preparation tasks permitting multiple iterations of event. The use of the JANUS facility reduces OPTEMPO expenditures, real logistics requirements, real movement time, land requirements, and recovery time. SAFOR/OCs are required to provide the rigor to conduct JANUS training. A TEWT, similar to a MAPEX, allows the Cdr to train his subordinate leaders & to analyze, plan, & present how they would conduct an operation on actual terrain. Can be used to analyze terrain; employ units; emplace weapons systems to best support the unit's mission; prepare plans; plan & place Slice elements & Combat trains. A TEWT requires limited vehicles and access to land. A Sandtable exercise can be configured to look like the terrain which operations are to take place on and replicate the planning, preparing and execution of operations similar to a MAPEX. Orders Drills and Company Seminars cover pertinent info that the Cdr deems important and focuses on "how" the task is to be executed.

MTP Tasks: Perform Assault Position Activities (17-2-0328), Support by Fire (17-2-0306), Assault Enemy Position Dismounted (17-2-0310), Assault Enemy Position Mounted (17-2-0326), Perform Attack by Fire (17-2-0311), Perform Raid (17-2-0308), Employ Indirect Fire (Offense) (17-2-0401), Defend Against Air Attack (Active) (44-2-C002), Process Enemy POWs (19-2-C004).

Enclosure 3

CATS Diagram



NOTES:
This diagram shows only the steps discussed in this guide to get from METL development to training design. It is not intended to show the complete Training Management Cycle which also includes execution, post-execution assessment, and feedback phases.
*Essential tasks are those needing to be trained to retain proficiency at the T-1 level and remain in the "band of excellence."
** A critical part of this activity is the allocation of time/facilities/TADSS to subordinates so they can train to all gate requirements.

APPENDIX B

LIST OF CATS TEMPLATES

This appendix contains a condensed version of the table of contents for the CATS templates for each of the eleven battalion/squadron types. The templates at the battalion/squadron level are expanded to show the missions that were considered in CATS development. The remaining templates are shown at the highest level only. Appendix C contains a complete listing of the table of contents for the Armor Battalion Task Force templates that shows how the other templates are broken out in support of the battalion/squadron-level missions.

In addition to the templates, a prototype two-year training calendar and a list of abbreviations, brevity codes, and acronyms were prepared for each of the eleven battalion/squadron types.

AIR DEFENSE ARTILLERY BATTALION (AVENGER)

Fight - Battalion

PROVIDE AIR DEFENSE AGAINST LOW-ALTITUDE HOSTILE AIRCRAFT FOR CORPS AND/OR JOINT COMBINED FORCES, AREAS OR INSTALLATIONS (OFFENSIVE AND DEFENSIVE OPERATIONS)

Fight - Staff Command and Control
Fight - Staff Intelligence
Fight - Staff Maneuver
Fight - Staff Fire Support
Fight - Staff Combat Service Support
Fight - Staff Mobility/Countermobility/Survivability
Fight - Firing Battery
Fight - Firing Platoon
Fight - Sensor Platoon

Deploy/Reception and Onward Movement /Redeploy - Battalion

DEPLOY
RECEPTION AND ONWARD MOVEMENT
REDEPLOY

Deploy/Reception and Onward Movement /Redeploy - Staff Command and Control
Deploy/Reception and Onward Movement /Redeploy - Staff Combat Service Support
Deploy/Redeploy - Company

Sustain - Battalion

TRAINING MANAGEMENT
SOLDIERS SUPPORT
MAINTENANCE/MATERIEL MANAGEMENT
INSTALLATION SUPPORT

AIR DEFENSE ARTILLERY BATTALION (HEAVY)

Fight - Battalion

PROVIDE AIR DEFENSE AGAINST LOW-ALTITUDE HOSTILE AIRCRAFT AND PROVIDE GROUND FIRE AGAINST SURFACE TARGETS
CONDUCT AIR DEFENSE OPERATIONS OFFENSE AND DEFENSE
CONDUCT SUSTAINING OPERATIONS
PROVIDE COMMAND, CONTROL, AND SUPERVISION OF THE OPETRATIONS FOR THE BATTALION ASSETS WITHIN THE DIVISION AREA OF OPERATIONS

Fight - Staff Command and Control
Fight - Staff Intelligence
Fight - Staff Maneuver
Fight - Staff Fire Support
Fight - Staff Combat Service Support
Fight - Staff Mobility/Countermobility/Survivability
Fight - Battery (Bradley Stinger Fighting Vehicle)
Fight - Platoon (Bradley Stinger Fighting Vehicle)
Fight - Sensor Platoon

Deploy/Reception and Onward Movement /Redeploy - Battalion

DEPLOY
RECEPTION AND ONWARD MOVEMENT
REDEPLOY

Deploy/Reception and Onward Movement /Redeploy - Staff Command and Control
Deploy/Reception and Onward Movement /Redeploy - Staff Combat Service Support
Deploy/Redeploy - Company

Sustain - Battalion

TRAINING MANAGEMENT
SOLDIERS SUPPORT
MAINTENANCE/MATERIEL MANAGEMENT
INSTALLATION SUPPORT

ARMOR BATTALION TASK FORCE

Fight - Battalion Task Force

MOVEMENT TO CONTACT
ATTACK
DEFEND
TACTICAL ROAD MARCH
OCCUPY ASSEMBLY AREA

Fight - Staff Command and Control
Fight - Staff Intelligence
Fight - Staff Fire Support
Fight - Staff Combat Service Support
Fight - Staff Mobility/Countermobility/Survivability
Fight - Staff Air Defense
Fight - Company Team
Fight - Tank Platoon
Fight - Scout Platoon
Fight - Mortar Platoon
Fight - Crew/Individual

Deploy/Reception and Onward Movement /Redeploy - Battalion

DEPLOY
RECEPTION AND ONWARD MOVEMENT
REDEPLOY

Deploy/Reception and Onward Movement /Redeploy - Staff Command and Control
Deploy/Reception and Onward Movement /Redeploy - Staff Combat Service Support
Deploy/Redeploy - Company

Sustain - Battalion

TRAINING MANAGEMENT
SOLDIERS SUPPORT
MAINTENANCE/MATERIEL MANAGEMENT
INSTALLATION SUPPORT

ASSAULT HELICOPTER (UH-60) BATTALION TASK FORCE

Fight - Battalion Task Force

CONDUCT TACTICAL MOVEMENT
OCCUPY AN ASSEMBLY AREA AND CONDUCT ASSEMBLY AREA OPERATIONS
CONDUCT COMBAT AVIATION, AIR ASSAULT AND AIR MOVEMENT OPERATIONS
CONDUCT COMBAT SERVICE SUPPORT OF TACTICAL OPERATIONS

Fight - Staff Command and Control
Fight - Staff Intelligence
Fight - Staff Fire Support
Fight - Staff Combat Service Support
Fight - Staff Mobility/Countermobility/Survivability
Fight - Staff Air Defense
Fight - Headquarter and Headquarters Company
Fight - Assault Helicopter Company
Fight - Command Aviation-SIGINT/EW Helicopter Company
Fight - Aviation Maintenance Company (AVUM)
Fight - HHC Platoon/Section
Fight - Crew/Individual

Deploy/Reception and Onward Movement /Redeploy - Battalion

DEPLOY
RECEPTION AND ONWARD MOVEMENT
REDEPLOY

Deploy/Reception and Onward Movement /Redeploy - Staff Command and Control
Deploy/Reception and Onward Movement /Redeploy - Staff Combat Service Support
Deploy/Redeploy - Company

Sustain - Battalion

TRAINING MANAGEMENT
SOLDIERS SUPPORT
MAINTENANCE/MATERIEL MANAGEMENT
INSTALLATION SUPPORT

ATTACK HELICOPTER (AH-64) BATTALION/SQUADRON TASK FORCE

Fight - Battalion/Squadron Task Force

TACTICAL MOVEMENT (GROUND) AND (AIR)
ASSEMBLY AREA OPERATIONS
MOVEMENT TO CONTACT (MTC)
RECONNAISSANCE
ATTACK
AIR ASSAULT SECURITY
CS AND CSS SUPPORT

Fight - Staff Command and Control
Fight - Staff Intelligence
Fight - Staff Fire Support
Fight - Staff Combat Service Support
Fight - Staff Mobility/Countermobility/Survivability
Fight - Staff Air Defense
Fight - Company/Troop
Fight - Attack and Armed-Scout Platoons
Fight - Crew/Individual

Deploy/Reception and Onward Movement /Redeploy - Battalion

DEPLOY
RECEPTION AND ONWARD MOVEMENT
REDEPLOY

Deploy/Reception and Onward Movement /Redeploy - Staff Command and Control
Deploy/Reception and Onward Movement /Redeploy - Staff Combat Service Support
Deploy/Redeploy - Company

Sustain - Battalion

TRAINING MANAGEMENT
SOLDIERS SUPPORT
MAINTENANCE/MATERIEL MANAGEMENT
INSTALLATION SUPPORT

CAVALRY SQUADRON (HEAVY DIVISION)

Fight - Squadron

RECONNAISSANCE OPERATIONS
SECURITY OPERATIONS
ECONOMY OF FORCE MISSIONS
TACTICAL ROAD MARCH
ASSEMBLY AREA OPERATIONS

Fight - Staff Command and Control
Fight - Staff Intelligence
Fight - Staff Fire Support
Fight - Staff Combat Service Support
Fight - Staff Mobility/Countermobility/Survivability
Fight - Staff Air Defense
Fight - Air Reconnaissance Troop
Fight - Ground Troop
Fight - Scout Platoon
Fight - Tank Platoon
Fight - Mortar Section
Fight - Air Crews, M3A1 CFV Crew, and M1A1 Tank Crew

Deploy/Reception and Onward Movement /Redeploy - Battalion

DEPLOY
RECEPTION AND ONWARD MOVEMENT
REDEPLOY

Deploy/Reception and Onward Movement /Redeploy - Staff Command and Control
Deploy/Reception and Onward Movement /Redeploy - Staff Combat Service Support
Deploy/Redeploy - Company

Sustain - Battalion

TRAINING MANAGEMENT
SOLDIERS SUPPORT
MAINTENANCE/MATERIEL MANAGEMENT
INSTALLATION SUPPORT

ENGINEER BATTALION, ENGINEER BRIGADE, HEAVY DIVISION

Fight - Battalion

CONDUCT MOBILITY OPERATIONS
CONDUCT COUNTERMOBILITY OPERATIONS
CONDUCT SURVIVABILITY OPERATIONS
CONDUCT TACTICAL ROAD MARCH
CONDUCT ASSEMBLY AREA OPERATIONS

Fight - Staff Command and Control
Fight - Staff Intelligence
Fight - Staff Maneuver
Fight - Staff Fire Support
Fight - Staff Combat Service Support
Fight - Staff Air Defense
Fight - Engineer Company
Fight - Engineer Platoon
Fight - Support Platoon
Fight - Engineer Squad
Fight - Crews (ACE, AVLB, CEV, M113, Volcano)

Deploy/Reception and Onward Movement /Redeploy - Battalion

DEPLOY
RECEPTION AND ONWARD MOVEMENT
REDEPLOY

Deploy/Reception and Onward Movement /Redeploy - Staff Command and Control
Deploy/Reception and Onward Movement /Redeploy - Staff Combat Service Support
Deploy/Redeploy - Company

Sustain - Battalion

TRAINING MANAGEMENT
SOLDIERS SUPPORT
MAINTENANCE/MATERIEL MANAGEMENT
INSTALLATION SUPPORT

FIELD ARTILLERY BATTALION (155mm SELF-PROPELLED)

Fight - Battalion

DELIVER FIRES
ACQUIRE TARGETS
FIRE SUPPORT
COMMUNICATE
MOVE
MAINTAIN AND RESUPPLY
SURIVIVE

Fight - Staff Command and Control
Fight - Staff Intelligence
Fight - Staff Fire Support
Fight - Staff Combat Service Support
Fight - Mobility/Countermobility/Survivability
Fight - Staff Air Defense
Fight - Firing Battery
Fight - Firing Platoon
Fight - Section/Crew Level

Deploy/Reception and Onward Movement /Redeploy - Battalion

DEPLOY
RECEPTION AND ONWARD MOVEMENT
REDEPLOY

Deploy/Reception and Onward Movement /Redeploy - Staff Command and Control
Deploy/Reception and Onward Movement /Redeploy - Staff Combat Service Support
Deploy/Redeploy - Company

Sustain - Battalion

TRAINING MANAGEMENT
SOLDIERS SUPPORT
MAINTENANCE/MATERIEL MANAGEMENT
INSTALLATION SUPPORT

FIELD ARTILLERY BATTALION (MLRS)

Fight - Battalion

DELIVER FIRES
COMMUNICATE
MOVE
MAINTAIN AND RESUPPLY
SURIVIVE

Fight - Staff Command and Control
Fight - Staff Intelligence
Fight - Staff Combat Service Support
Fight - Mobility/Countermobility/Survivability
Fight - Headquarters, Headquarters and Service Battery
Fight - MLRS Firing Battery
Fight - Platoon
Fight - Launcher Section

Deploy/Reception and Onward Movement /Redeploy - Battalion

DEPLOY
RECEPTION AND ONWARD MOVEMENT
REDEPLOY

Deploy/Reception and Onward Movement /Redeploy - Staff Command and Control
Deploy/Reception and Onward Movement /Redeploy - Staff Combat Service Support
Deploy/Redeploy - Company

Sustain - Battalion

TRAINING MANAGEMENT
SOLDIERS SUPPORT
MAINTENANCE/MATERIEL MANAGEMENT
INSTALLATION SUPPORT

FORWARD SUPPORT BATTALION (HEAVY DIVISION)

Fight - Battalion

PLAN CSS OPERATIONS
RELOCATE THE BSA
ESTABLISH THE BSA
PROVIDE CSS
CONDUCT REAR OPERATIONS

Fight - Staff
Fight - Headquarters Detachment
Fight - Company A (Supply)
Fight - Company B (Maintenance)
Fight - Company C (Medical)
Fight - Crew
Fight - Individual

Deploy/Reception and Onward Movement /Redeploy - Battalion

DEPLOY
RECEPTION AND ONWARD MOVEMENT
REDEPLOY

Deploy/Reception and Onward Movement /Redeploy - Staff Command and Control
Deploy/Reception and Onward Movement /Redeploy - Staff Combat Service Support
Deploy/Redeploy - Company

Sustain - Battalion

TRAINING MANAGEMENT
SOLDIERS SUPPORT
MAINTENANCE/MATERIEL MANAGEMENT
INSTALLATION SUPPORT

MECHANIZED INFANTRY BATTALION TASK FORCE

Fight - Battalion Task Force

MOVEMENT TO CONTACT
ATTACK
DEFEND
TACTICAL ROAD MARCH
OCCUPY ASSEMBLY AREA

Fight - Staff Command and Control
Fight - Staff Intelligence
Fight - Staff Fire Support
Fight - Staff Combat Service Support
Fight - Staff Mobility/Countermobility/Survivability
Fight - Staff Air Defense
Fight - Company Team
Fight - Infantry Platoon
Fight - Scout Platoon
Fight - Mortar Platoon
Fight - Dismounted Squad
Fight - BFV Crew

Deploy/Reception and Onward Movement /Redeploy - Battalion

DEPLOY
RECEPTION AND ONWARD MOVEMENT
REDEPLOY

Deploy/Reception and Onward Movement /Redeploy - Staff Command and Control
Deploy/Reception and Onward Movement /Redeploy - Staff Combat Service Support
Deploy/Redeploy - Company

Sustain - Battalion

TRAINING MANAGEMENT
SOLDIERS SUPPORT
MAINTENANCE/MATERIEL MANAGEMENT
INSTALLATION SUPPORT

APPENDIX C

EXAMPLE TABLE OF CONTENTS FOR CATS TASK TEMPLATES

ARMOR BATTALION TASK FORCE

Fight - Battalion Task Force

Fight - Staff Command and Control

Fight - Staff Intelligence

Fight - Staff Fire Support

Fight - Staff Combat Service Support

Fight - Staff Mobility/Countermobility/Survivability

Fight - Staff Air Defense

Fight - Company Team

Fight - Tank Platoon

Fight - Scout Platoon

Fight - Mortar Platoon

Fight - Crew/Individual

Deploy/Reception and Onward Movement /Redeploy - Battalion

Deploy/Reception and Onward Movement /Redeploy - Staff Command and Control

Deploy/Reception and Onward Movement /Redeploy - Staff Combat Service Support

Deploy/Redeploy - Company

Sustain - Battalion

Calendars

Abbreviations/Brevity Codes/Acronyms

APPENDIX D

CONVERSION OF CATS DATABASE FOR SATS INPUT

During Phase II of CATS Development and Validation, the Office of the Deputy Chief of Staff for Operations and Plans (ODCSOPS) expressed a desire to have the CATS matrices input into a relational database that could be input, in turn, into the Standard Army Training System (SATS) database. In a meeting with ODCSOPS on 15 June 1995, BDM agreed to convert the CATS matrices to such a relational database and to deliver this product, at no added cost, to the Army Training Support Command (ATSC) by 20 October 1995.

In subsequent meetings with ATSC personnel responsible for SATS, a database schema was developed and agreed upon that included 10 tables. These tables and their relationships are shown in Figure G-1. Commercial, off-the-shelf software (COTS) was used to develop a process to translate the data from the original word processor format (WordPerfect) to the relational database. During the period 15 September - 20 October 1995, BDM incrementally delivered completed initial draft battalion CATS matrices to ATSC in database format (a total of 8.95 megabytes).

This submission should be viewed as a trial, not a finished product. At the time the conversion was made, the CATS matrices were only partly validated and many changes have been implemented since then. The Unit Commander's Guide (Appendix A), developed in the interim, should be added to the database. This will require some additional coordination regarding the form and format for delivery. In addition, SATS has been upgraded to release 4.0 and is due to be upgraded to release 4.1 by January 1997. While there is no obvious difficulty in using the same procedures to translate the content of the matrices into SATS, the changes in SATS software and the changes and additions to CATS content require careful review and coordination. There are some additional points requiring resolution before the next submission can take place. It is important to resolve these expeditiously if the final CATS matrices are to be included in SATS release 4.1.

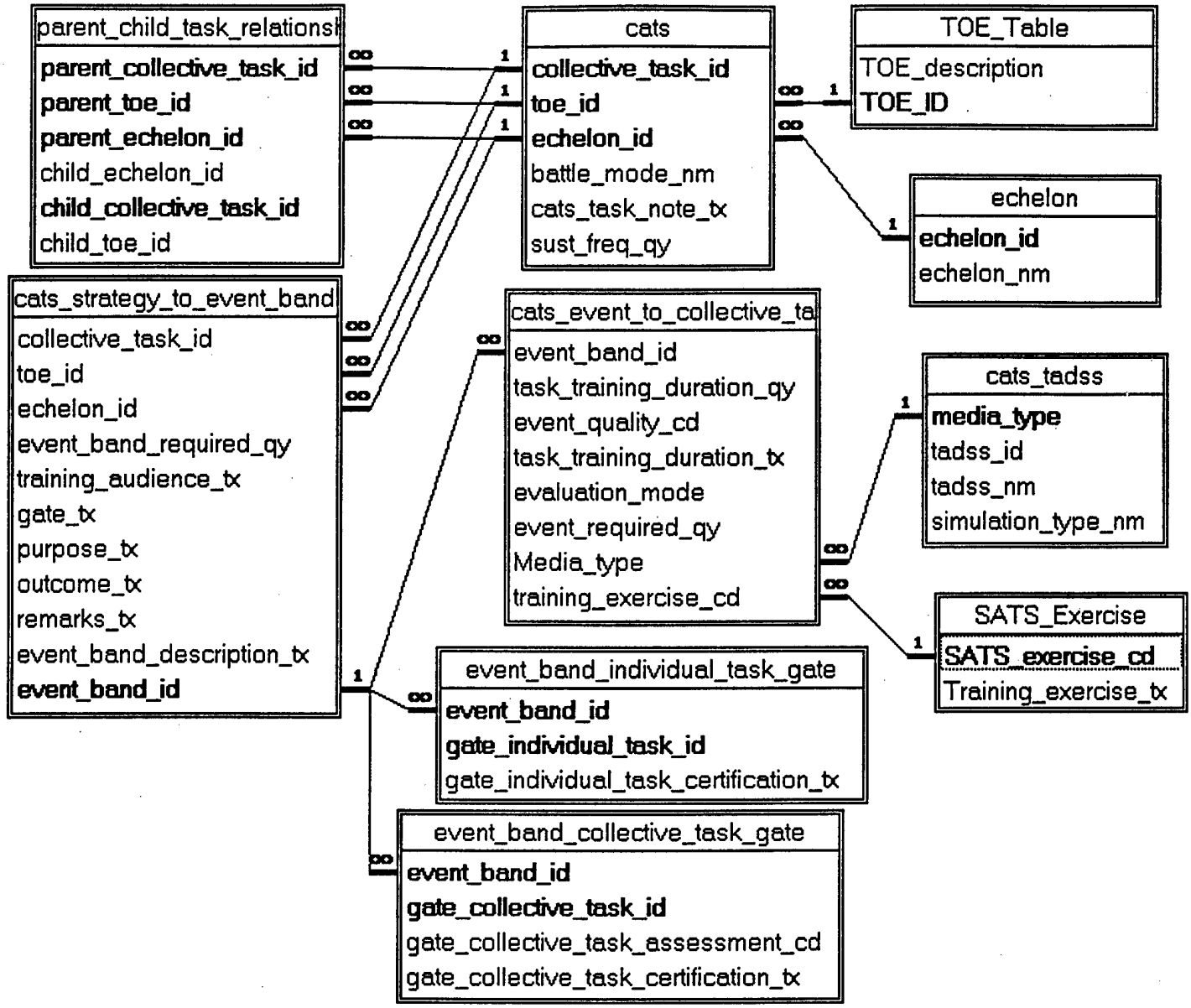


Figure G-1. Database Schema

Index fields are shown in bold within each table. One-to-many relational linkages between table indices are shown by connecting lines.

The issues which need to be resolved are as follows:

Issue A: The event codes which were used for SATS events were from SATS version 3.0. These codes lack the precision inherent in the CATS event listings. Using the SATS Exercise Codes in the CATS database results in a loss of granularity, because several CATS events are rolled up under a single SATS Code. For example, the SATS Exercise Code for "Weapons Training" includes approximately 35 different events identified within CATS (See Table G-1). **Suggested Resolution**: An additional table could be constructed that would relate the SATS event codes to the more detailed CATS codes. ATSC could then make use of this level of detail within SATS by utilizing the additional table. Or, ATSC could migrate the CATS codes into SATS versions over time. Coordination between ATSC and BDM is required to design and implement the additional table, accounting for recent changes to both SATS and CATS.

Issue B: Battalion/Squadron level events are currently clearly embedded in SATS, v 4.0. It must be determined how Company/Team/Troop/Battery, Platoon/Section, Squad/Crew, and Individual events and their myriad related tasks will be embedded in SATS to incorporate the structured training approach that the gate tasks within CATS engender. **Suggested Resolution**: Future versions of SATS should include the full range of events available in CATS (Issue A) and incorporate the logic found in the Unit Commander's Guide.

Issue C: The mapping in SATS of the CATS Table of Organization and Equipment (TO&E) codes is inadequate. The meaning of this code within SATS was not clear at the time of the trial conversion. CATS codes were developed to match SATS codes, but for some of the subordinate organizations CATS codes were invented that may not match SATS codes. It is not clear whether this means that some unit-level users of SATS will not have access to both CATS and SATS information. The TO&E code field in the database is nine characters wide, which raises the question of how much detail is needed and whether too much detail would be unnecessarily burdensome for the ultimate users. The TO&E code may include information about subtle differences in equipment that would not make a difference to the training strategy. So, some effort is needed to determine the range of TO&E codes to which each CATS template applies. **Suggested Resolution**: The way in which the TO&E codes are used to identify information appropriate to a particular unit needs to be re-examined to be sure that units have access to the correct CATS templates and calendars. This issue may be linked to Issue B and will require detailed technical discussions to achieve the desired result without making SATS more difficult to use for the trainer and training manager.

Issue D: Continued development of SATS and the Automated Systems Approach To Training (ASAT) require the final CATS input to be aligned with the requirements of these two systems as well as the Army Training Digital Library. **Suggested Resolution**: SATS needs to be updated with the Final version of CATS in a database form that can be used in all training management systems under development in the near term.

Table G-1: SATS Event Codes versus CATS Events

SATS Code	CATS Event Description
Weapons Training	Table I
	Table II A
	Table II B
	Table III
	Table IV
	Table V
	Table VI
	Table VII
	Table VIII (Squad Certification)
	Table IX
	Table X
	Table XI
	Table XII-EVALUATION
	Baseline & Practice Gunnery
	BGST (Bradley Gunnery Skills Test)
	BCPC (Bradley Crew Proficiency Course)
	PGS (Precision Gunnery System)/ MILES
	Sustain RA level 30 on UCOFT
	Main Gun Boresight
	TCGST
	Basic Rifle Marksmanship Training
	Sustain selected Crew Skills (BCGST)
	Marksmanship Training (Small Arms Range)
	MACS Tng
	Weaponeer Tng
	FWS2 TABLE V
	Small Arms Firing
	M60 Firing
	.50 Cal MG Firing
	CMS TABLE V
	Move and shoot range
	Gunnery skills test
	Section level training, Artillery Table 2
	Weapons Training (Approprate weapons calibration range)
	Live firing